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THE NATIONAL GEOGRAPHIC MAGAZINE

MARCH, 1910

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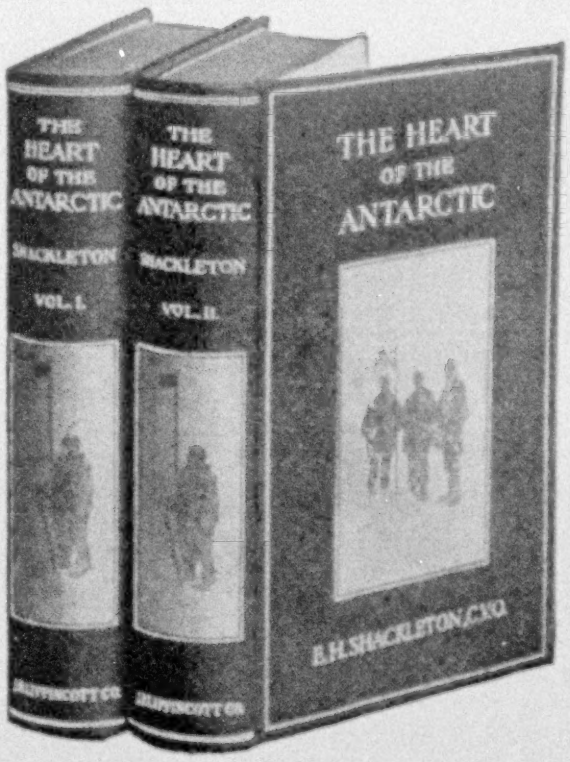

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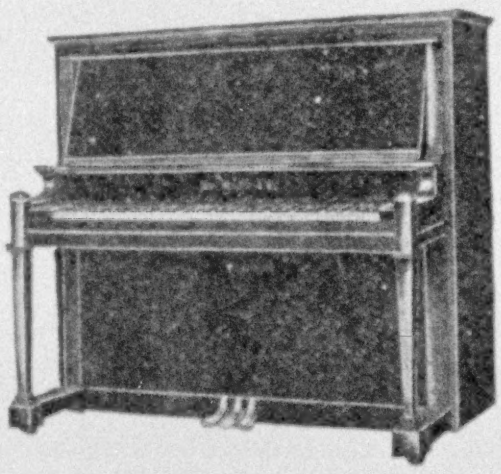

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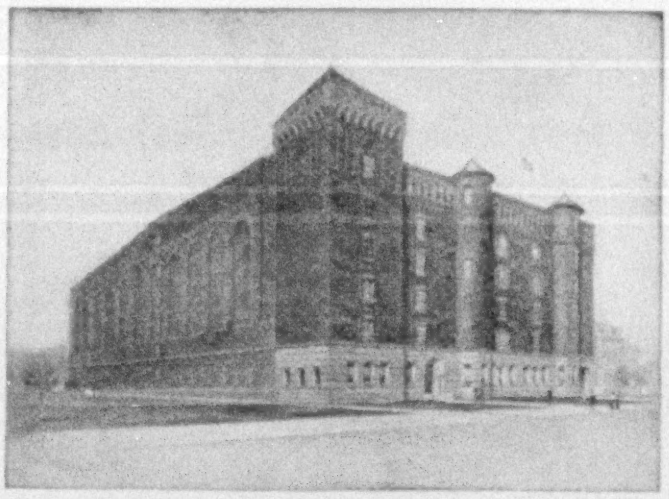

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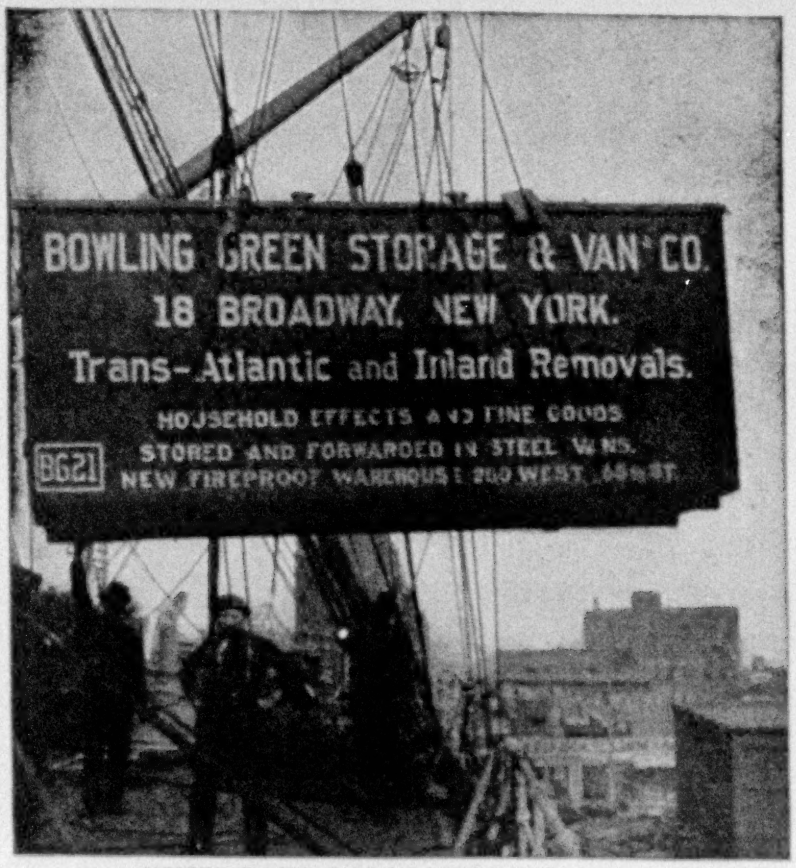

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VOL. XXI, No. 3 WASHINGTON MARCH, 1910

THE NATIONAL GEOGRAPHIC MAGAZINE

THE RACE FOR THE SOUTH POLE

INTEREST in the American expedition to the South Polar regions has been very much increased during the past month by the coming to the United States of Sir Ernest H. Shackleton. This distinguished explorer gave his first lecture in America in Washington, March 26, to 5,000 members and guests of the National Geographic Society. At the conclusion of the address the President of the United States, on behalf of the Society, presented him with the Hubbard Gold Medal of the National Geographic Society, recently awarded Sir Ernest for his important discoveries in the Antarctic regions and for gaining farthest south—88° 23′—January 9, 1909.

"No private citizen has ever received a more auspicious welcome to America. Statesmen, diplomats, scientists, artists, men of letters, and men of distinction in every walk of life united in a great chorus of greeting to one of the most distinguished Englishmen of the present day. The audience included the President of the United States, Commander Robert E. Peary, the Ambassador of Great Britain and the entire staff of the British Embassy, the ambassadors of France, Germany, Japan, and Mexico, the ministers of Costa Rica, Portugal, Norway, The Netherlands, Denmark, Switzerland, and Sweden, the Secretary of the Treasury, the Secretary of War, the Secretary of the Navy, the Secretary of Commerce and Labor, the Admiral of the Navy, and many Members of Congress. Shackleton bore the honors crowded upon him with the spirit which he has shown since he emerged from the Antarctic regions nearly a year ago—with modesty and simple grace."

The expedition which formed the subject of his address has been fully described in previous numbers of the NATIONAL GEOGRAPHIC MAGAZINE.* Sir Ernest will repeat his lecture in many parts of the United States during April, May, and June.

His narrative is one of the most inspiring stories of adventure and accomplishment ever told, the courage, wit, pluck, resourcefulness, and good comradeship of the leader and his men making a most thrilling tale. Particularly interesting are moving pictures of the strange penguin, a bird 4 feet in height and weighing 90 pounds, which cannot fly and waddles something like a seal.

Lieutenant Shackleton holds the record, not only for getting 400 miles nearer the South Pole than any of his predecessors, but also for the unparalleled importance of his contributions to scientific knowledge of conditions in the far south. The cost of his expedition was much greater than the funds he had personally raised, so that when he returned to England in 1909 he found himself $175,000 in debt. The British government knighted him for his achievements and made him a grant of $100,000. The balance he is now paying off by lectures and by his book, "The Heart of the Antarctic."

* NAT. GEOG. MAG., April and November, 1909.

PRESENTATION OF THE HUBBARD MEDAL BY PRESIDENT TAFT

Sir Ernest Shackleton: It is my pleasant duty to represent the National Geographic Society in presenting to you the evidence of its high appreciation of the marvelous work that you have done in the cause of science; and the endurance, courage, and intelligence shown in the pursuit of a definite object. I am sure that you will the more appreciate this medal, as it comes from the National Geographic Society, that has among its prominent members that distinguished American, Commander Robert E. Peary, who, while you were working at the South Pole, was himself surrounding the North Pole.

I do not know that nature had in mind the variety that was to be added to the lectures by the differences between her at the North Pole and at the South Pole, but certainly the different character of the surroundings of the North Pole and the South Pole make of entrancing interest the stories with respect to both.

You will permit me, therefore, to have the honor of handing you the medal of the Society, which gives its evidence of how highly they appreciate your services to science and to mankind.

RESPONSE BY SIR ERNEST SHACKLETON.

Mr. President: It is a very great honor for me to have this medal from the National Geographic Society, and especially as it is given to me by the hands of the distinguished President of the United States. It could not mean more for me than to have it given in this way in this great hall. But while I am standing I would like to say that Commander Peary will have as warm a welcome over in England as I have received from your great American society tonight. Commander Peary's work belongs not only to America, but to the world.

We are all pleased, and we wish, of course, a good measure of success to any forthcoming American expedition to the South Polar regions, because they have got a very hard job to tackle on the other side.

And, sir, I thank you. It is a very great honor to me. I thank you very much for having presented this medal.

THE RACE FOR THE SOUTH POLE

During the past month each member of the National Geographic Society has received an invitation to subscribe to the American expedition to the South Pole under the auspices of the Peary Arctic Club and the National Geographic Society. Such generous responses have been received from a large body of the members that it is believed the expedition will be able to leave in September.

Sufficient funds at this writing have, however, not been secured, and those members of the Society who are interested in the work and have not yet sent in their subscriptions are earnestly requested to do so immediately. The subscriptions range from $1.00 to $500. While large subscriptions are welcome, the Society hopes that all members will be sufficiently interested to subscribe from $1.00 to $5.00.

The reasons why an expedition should leave this year are as follows:

1. The expedition can be equipped at approximately one-half the cost necessary to equip an expedition any other year, owing to the fact that the *Roosevelt* and all the material used on Commander Peary's last expedition are immediately available.

2. Peary's four lieutenants—Captain Bartlett, George Borup, McMillan, and Doctor Goodsell—and practically the entire crew of the last expedition are eager to join the American South Polar Expedition, provided it can leave this year. The American party could thus take advantage of men whose experience in polar work is unequalled.

3. From a scientific point of view, tidal and magnetic observations obtained at the same time that the English expedition are making simultaneous records on the other side of the South Pole will be vastly more important than if taken during another year, when there is no other expedition in the south. Similarly the work of the British expedition will be benefited by the American.

4. As Sir Ernest Shackleton has said, every step taken by the American expedition from its proposed base on the shores of Weddell Sea will be an entirely new discovery. No region in the world offers such an opportunity for the acquiring of new knowledge.

ROMANTIC SPAIN*

By Charles Upson Clark, of Yale University

SPAIN is still almost a *terra incognita*. The stern and yet fascinating country whose sons once dominated Europe and brought their language and their civilization to the western world has not yet been spoiled by the tourist. Cut off from the rest of Europe by the Pyrenees and the sea—forming, in fact, a detached bit of Africa—Spain has gone on through the centuries preserving countless ancient traits which give her life and people a peculiar stamp.

Since Spanish railways and hotels make traveling almost as simple a matter as in Italy, and the people are fully as courteous and honorable as any other, the American need not hesitate to include Spain in his itinerary, and may look forward to a wonderfully interesting experience. He will not, however, get the full benefit of it unless he is at home in Spanish history and not wholly ignorant of the language.

Nowhere else does the past, with its great warnings against pride, intolerance, and extravagance, so impress even the casual passer-by; and one is about as likely to find an English-speaking person in Spain as to find one who knows Spanish in New England.

Journeying into Spain from France, the traveler is promptly notified by a change of gauge at the frontier that even the railroads in Spain are different. Their gauge is over a foot wider than that of central Europe and of America; so passengers must change cars and freight be transshipped. This wide gauge is a great advantage, and American railroad men sigh for it. It enables more powerful locomotives and more capacious cars to be used, though the Spaniards have not yet risen to their opportunities. Their railway equipment is in general behind the times, although one or two through trains are equal to the best elsewhere, and I remember seeing a new Munich locomotive so powerful that it whisked twenty loaded passenger coaches up a grade with little effort.

By noticing the plaques on the engines, which tell when and where they were made, one can watch on Spanish railways the entire development of the locomotive. They come from everywhere, and seem never to be made into scrap. I have seen engines dating from the 50's still in use, and it was especially interesting to see machines which announce that they hail from Gravenhausen, Département du Bas-Rhin, thus proving that they date from before 1870, when Alsace became German territory.

European railroad practice is far behind ours in the use of air brakes on freight trains, and Spain is especially backward here, since few of her freight cars have even hand brakes. That leads to amusing methods of switching cars. When a brakeless car is started down its track the brakeman runs beside it and sets pebbles on the rail before it. These soon overcome its momentum. In the Madrid yards one sees a refinement of this system. At the end is a track running at right angles across the others; on this moves an electric engine, pushing a large platform on wheels, like one of our turn-tables. By means of a chain and capstan, the engine hauls the car to be switched upon this platform, and then pushes the load to the proper track. The car, when released, has considerable momentum; when the brakeman wants to stop it, he sets an ingenious iron shoe on the rail in front of the car. The car mounts the shoe, which is thereby knocked off the track; the brakeman

* The illustrations are from photographs by the author unless otherwise indicated.

XUM

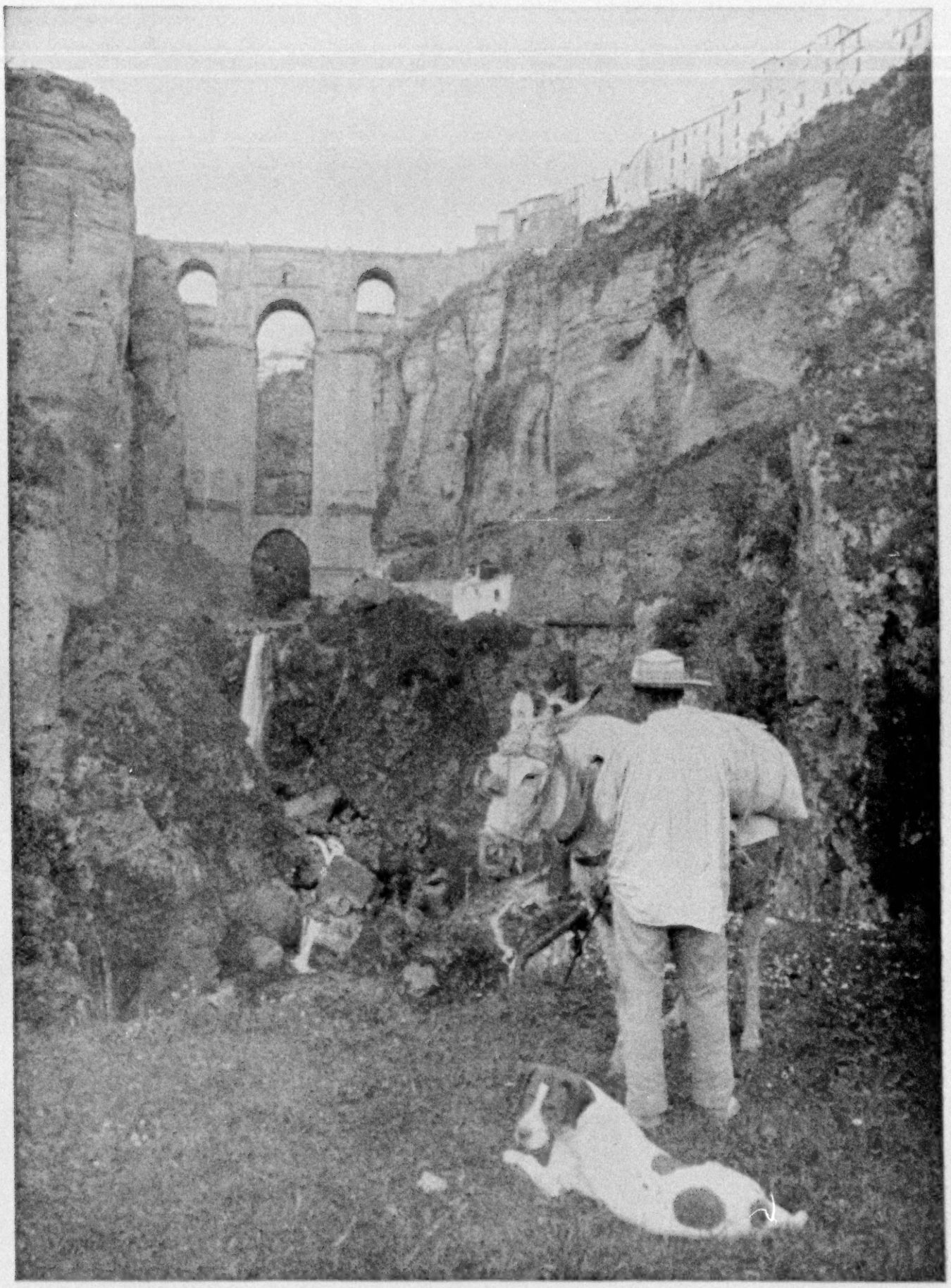
SKETCH MAP OF SPAIN

picks it up, runs ahead and repeats the operation. Needless to say, the car soon stops.

The Spanish railways have the best mileage-book system in the world; the more mileage you buy, the lower is the rate per mile (or, rather, per kilometer) and the longer the validity. One book is good for a family or members of a firm. If one plans to travel several thousand miles, it is possible by the use of these books to ride first-class (that is, Pullman accommodations) for not much more than regular third-class rates.

But travelers who know a little Spanish and have learned by experience in other lands that the genuine people, whom one comes to know, travel third-class, go in with them, regardless of bare wooden seats and crowded quarters. One can be very comfortable with a rug or two; and, instead of sophisticated French-speaking travelers, one has as neighbor an intelligent Castilian farmer, who uses an American harvester and whose wife has an American sewing machine, and who laments Spanish illiteracy and official corruption as the chief cause of her troubles; or it may be a Barcelona commercial traveler, who lays Spain's ills—which all admit, saying, "Pobre España!" (poor Spain)—to her highly centralized administration, which taxes the whole country, and especially rich and populous Catalonia, for Madrid office-holders.

The ancient divisions of Spain, for centuries independent and often hostile countries, still hold somewhat aloof from each other. The Catalans even speak a different language, allied to Provençal, as different from Castilian as Dutch is from English. They are an enterprising



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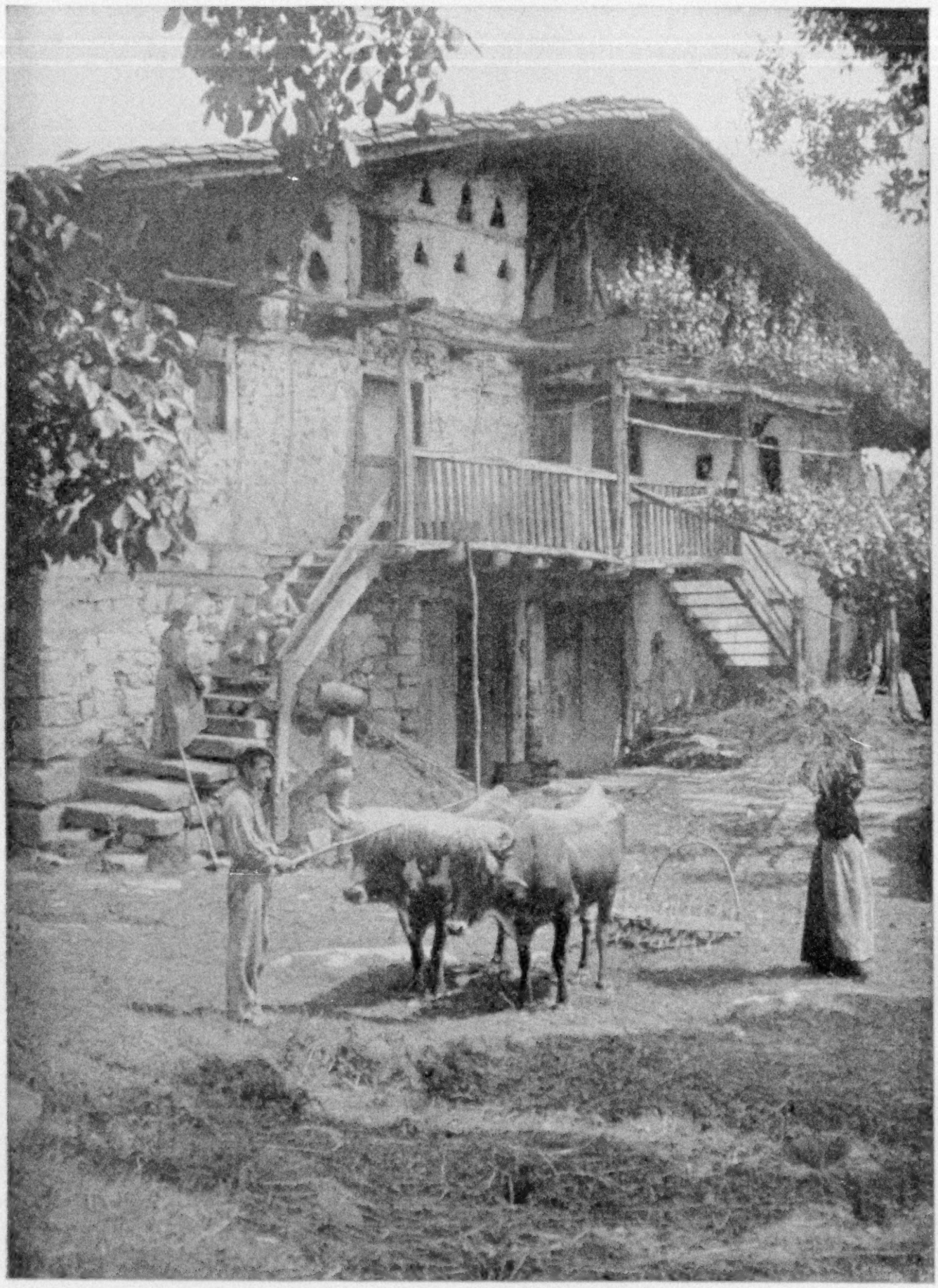
THE GREAT BRIDGE WHICH SPANS THE GORGE OF THE GUADALEON AT RONDA, AND CONNECTS OLD AND NEW RONDA AT A HEIGHT OF 400 FEET

XUM



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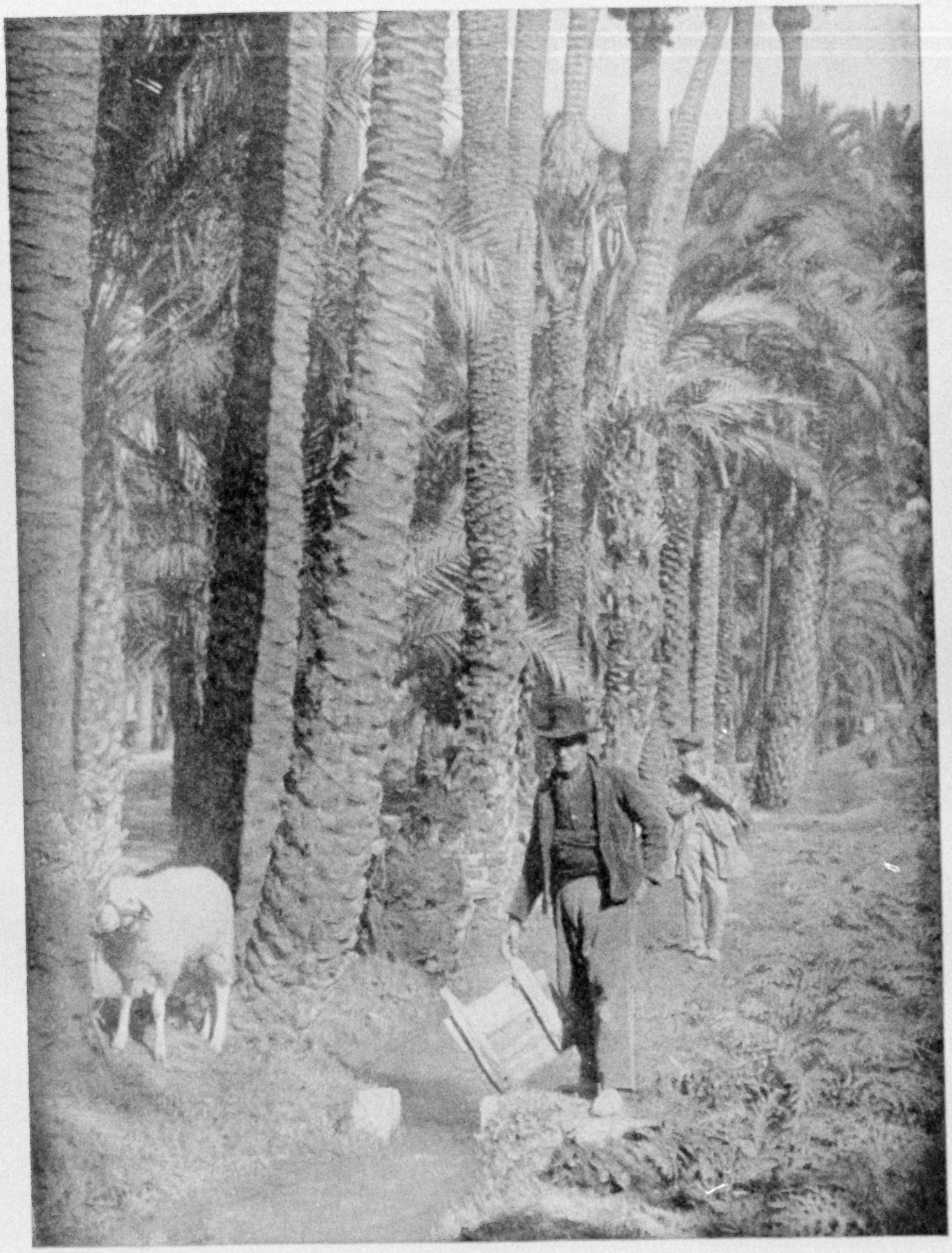
FARM-HOUSE RESEMBLING SWISS CHALET, TYPICAL OF THIS SECTION OF COUNTRY: LAMONA, SPAIN: THE OXEN ARE YOKED BY THE HORNS



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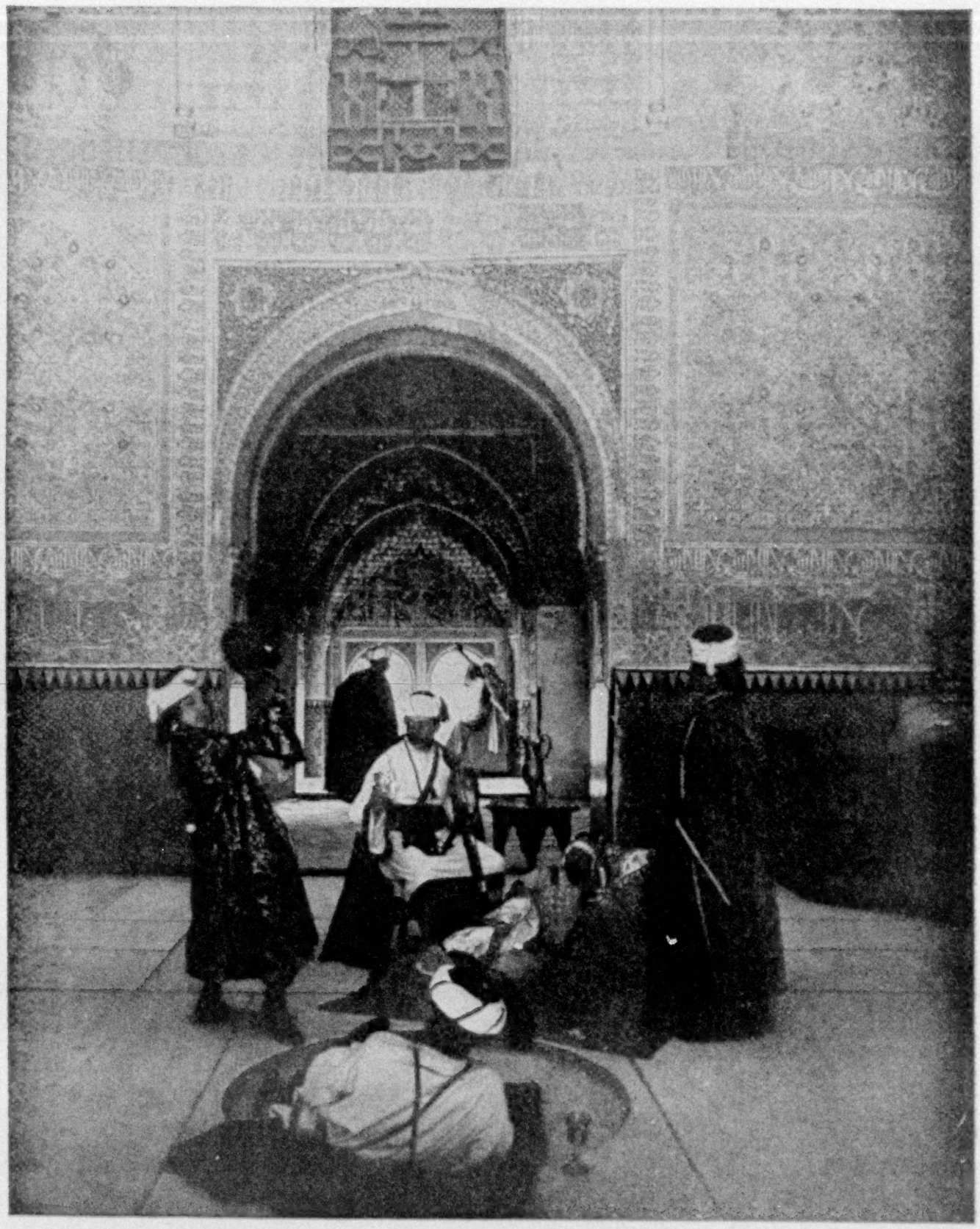
HOW THE DATE ORCHARDS OF ELCHE ARE WATERED—AN IRRIGATION CANAL AMONG THE FRUITFUL PALMS: SPAIN



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LOOKING ACROSS THE HALL OF THE TWO SISTERS TO THE "WINDOW OF LINDARAXA"

The tall vase in the right hand corner is the "Alhambra Vase," said to have been found full of gold after the flight of the last Moorish king. The figures are dressed in the costumes of the days of the Moorish kings (see page 214).

Photo by Louise Coleman

DANCING GIRLS OF SEVILLE

commercial and manufacturing people, and the country is dotted with cotton mills and factory chimneys.

As one comes from the north, the first important town is Gerona, memorable for the heroic defense against the French a century ago. The besiegers even poisoned the river. The city has several ancient churches, one with an old baptistery beside it, which a utilitarian age has turned into a lumber-room.

Barcelona, Spain's largest and busiest city, is a most attractive place, possessing the best climate in the western Mediterranean—more equable than that of Nice. A stroll along the Rambla, the chief boulevard, is full of interest. This part of it, the Rambla dels Flors (in Catalan, "of the flowers"), is given up for some blocks to flower booths. Just beyond are many-colored birds, twittering away in little wooden cages. One can take a delightful ride on the top of a double-decked trolley car to the Tibidabo, a pine-covered hill overlooking the city and its magnificent harbor.

A few miles down the coast is Tarragona, whose stately aqueduct is a reminder that she was the chief city of Roman Spain. In her museum is an old Roman grain mill, on which a humorous boy once cut in Latin: "Work, little donkey, the way I worked, and much good 'twill do you."

A few hours further south lies Tortosa, on the Ebro, the only large river in Spain emptying into the Mediterranean. Its waters are largely diverted into irrigation canals, which make the fields and gardens a delight to the eye; and the combination of date palms and waving wheat shows what a variety of products the country produces. One can still see on the streets huge jars which remind one of Ali Baba and the Forty Thieves, and in the wine stores wine is sold in pig-

RAMBLA DELS FLORS: THE PRINCIPAL BOULEVARD OF BARCELONA

VIEW OF GERONA (SEE PAGE 193)

skins, calked with pitch which gives it a taste much like that of the dilute spruce-gum into which wine degenerates in Greece.

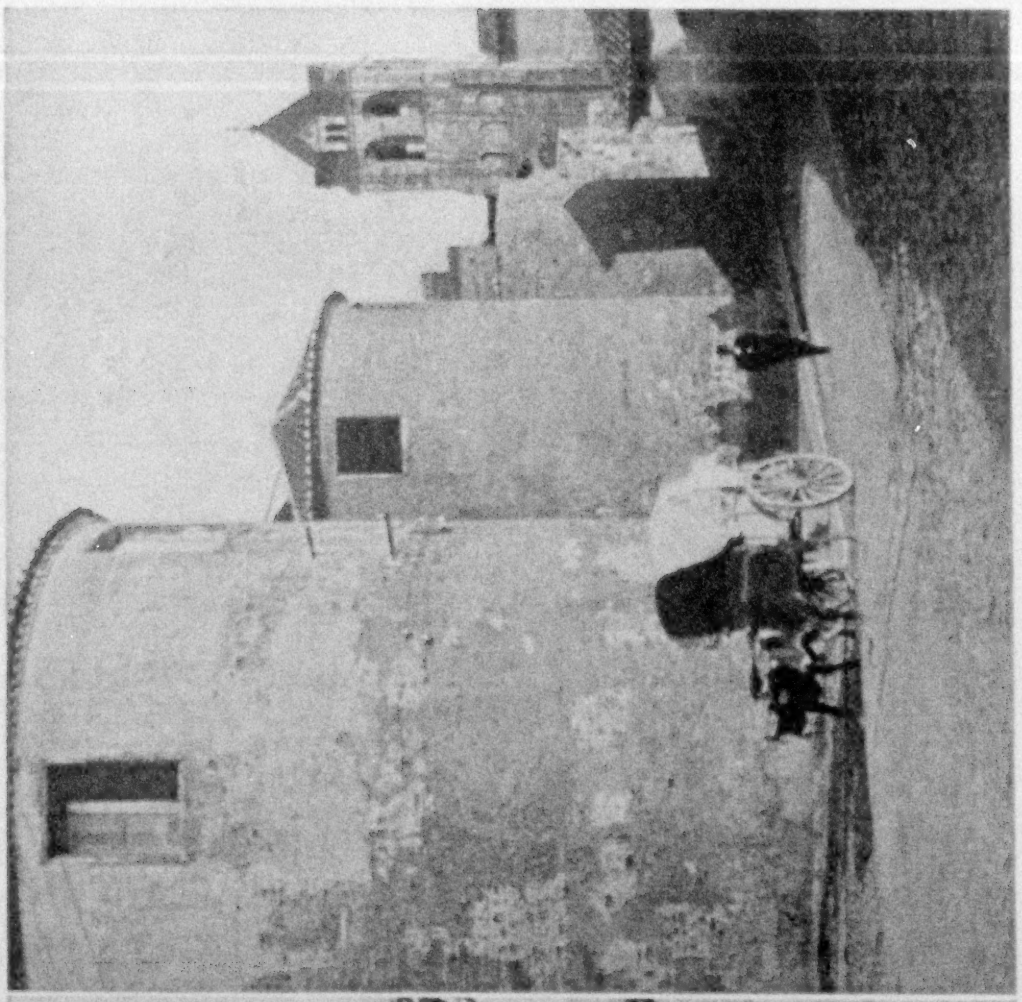
Turning inland one is soon met by the strangely toothed ridge of the Montserrat (about 4,000 feet high). This was the traditional home of the Holy Grail, and its monastery is a famous pilgrimage spot. A cog-wheel railway makes the trip an easy one. Cultured Benedictine monks still dwell under those tremendous cliffs, but their artistic treasures were looted by the French, who have several times found Spain a convenient gold and silver mine. The mountain is endlessly beautiful, with its views over to the Pyrenees and its wealth of vegetation. Its spring flowers are largely of blue color — violets, hepaticas, flax, larkspurs, hyachinths, and many others.

THE COMBINATION OF DATE PALMS AND WHEAT FIELD SHOWS THE VARIETY OF PRODUCTS

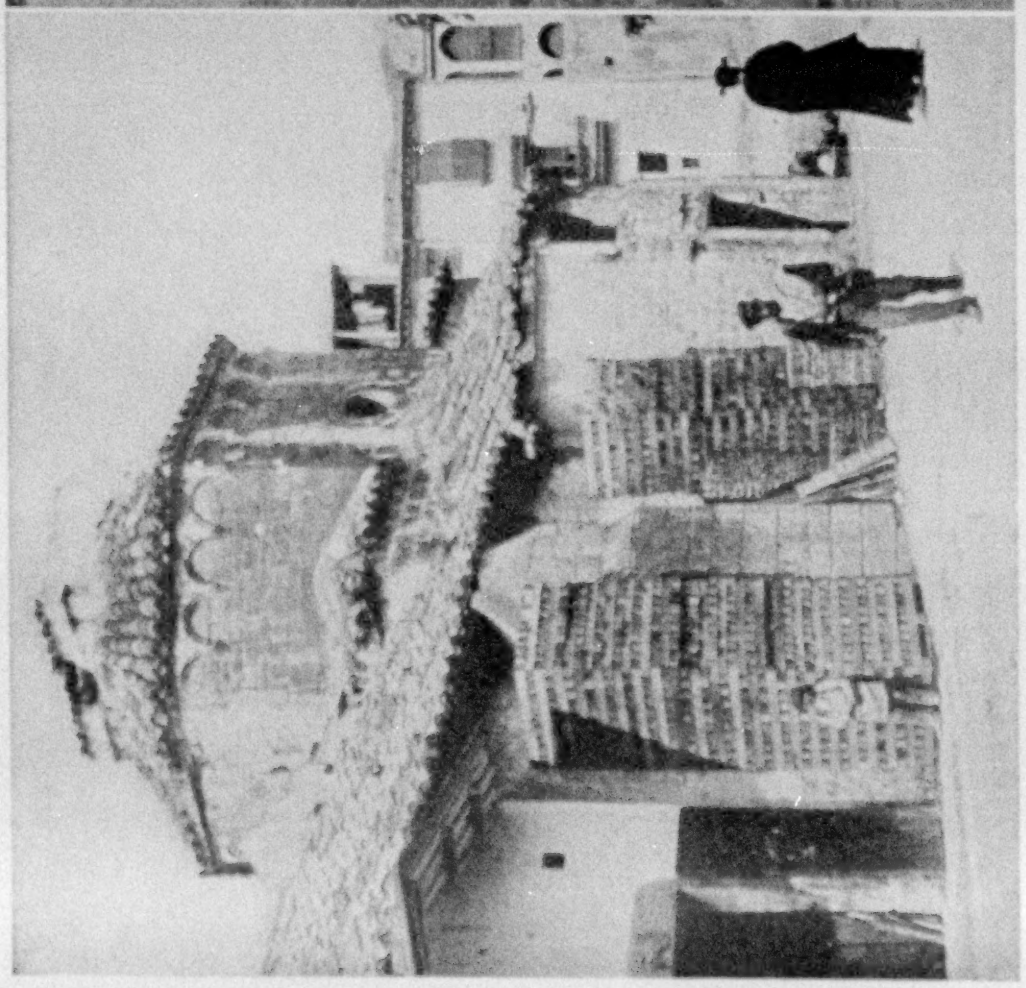
Now the train labors up to the bleak highlands of Castile, bare and forbidding. Central Spain is a high plateau, crossed by rugged mountains, scorched in summer and frozen stiff in winter. The Castilian farmer, too poor to purchase fertilizers or drill wells for irrigation, generally leaves the land fallow every other year. Then it seems a barren desert, and one is constantly struck with the contrast of the green wheat-fields on the strips under cultivation.

Here and there shepherds accompany their heavy-fleeced merinos, nibbling even as they cross ploughed land. The good-natured herdsmen, with their rough coats and skin trousers, have not much changed since Don Quixote's day, when the *mesta*, the sheep-owners' corporation, was as despotic as any western ranchers' association. Literally millions of sheep used to be driven across the country in the change from summer to winter pasture; they cropped close all vegetation—Spain's lack of forests is partly their fault—and the *mesta* was legally entitled to the hundred yards each side of the roadway for the sheep to graze upon. It is less than a century since the corporation lost its monopoly and the farmer got his rights.

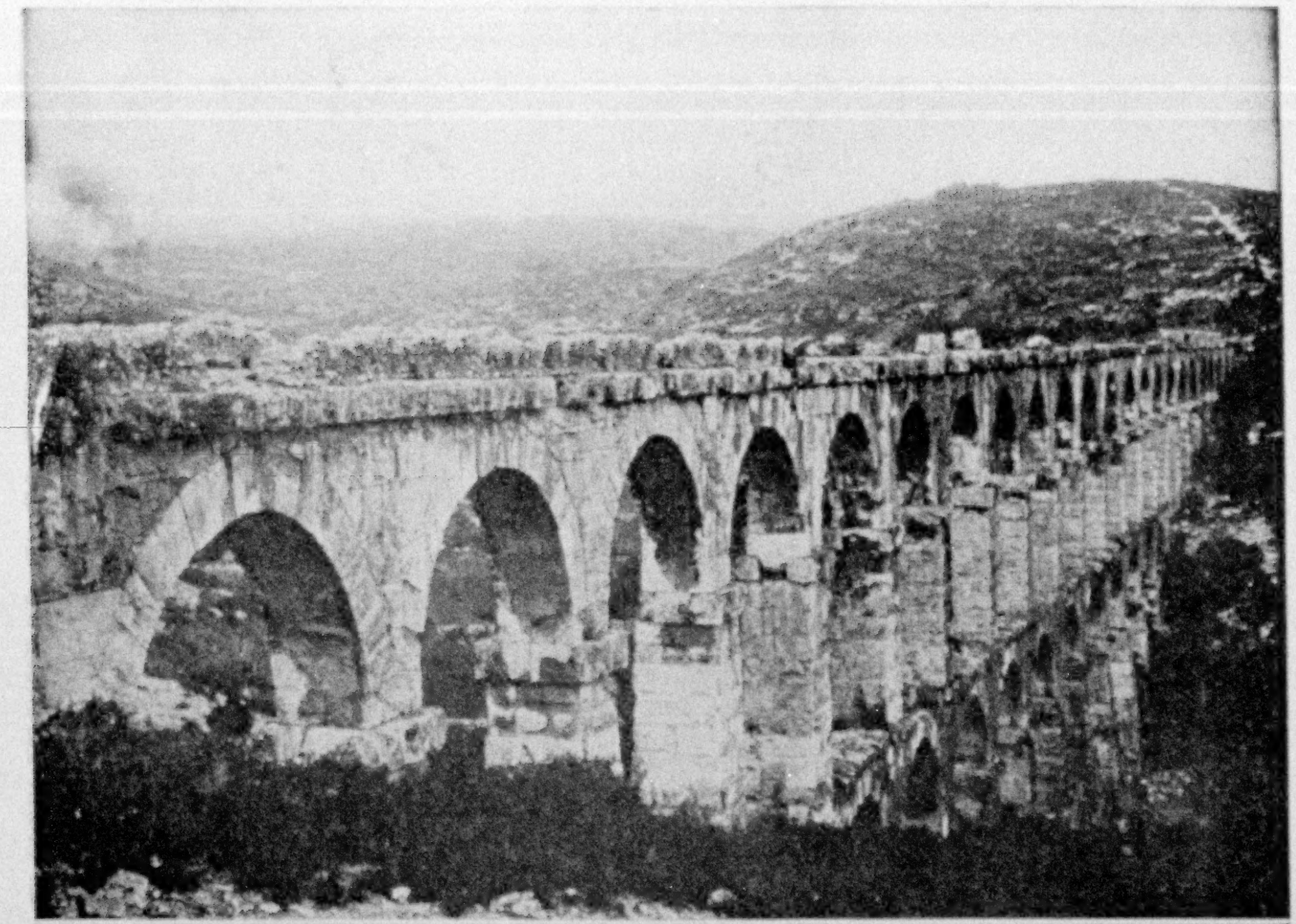
Seeing León's massive Roman walls and towers, one can easily believe that its name comes from the Roman legions once quartered here. The high church tower in the background is of Saint Isi-



THE ROMAN WALLS OF LEON, SAINT ISIDORE (SEE PAGE 195)

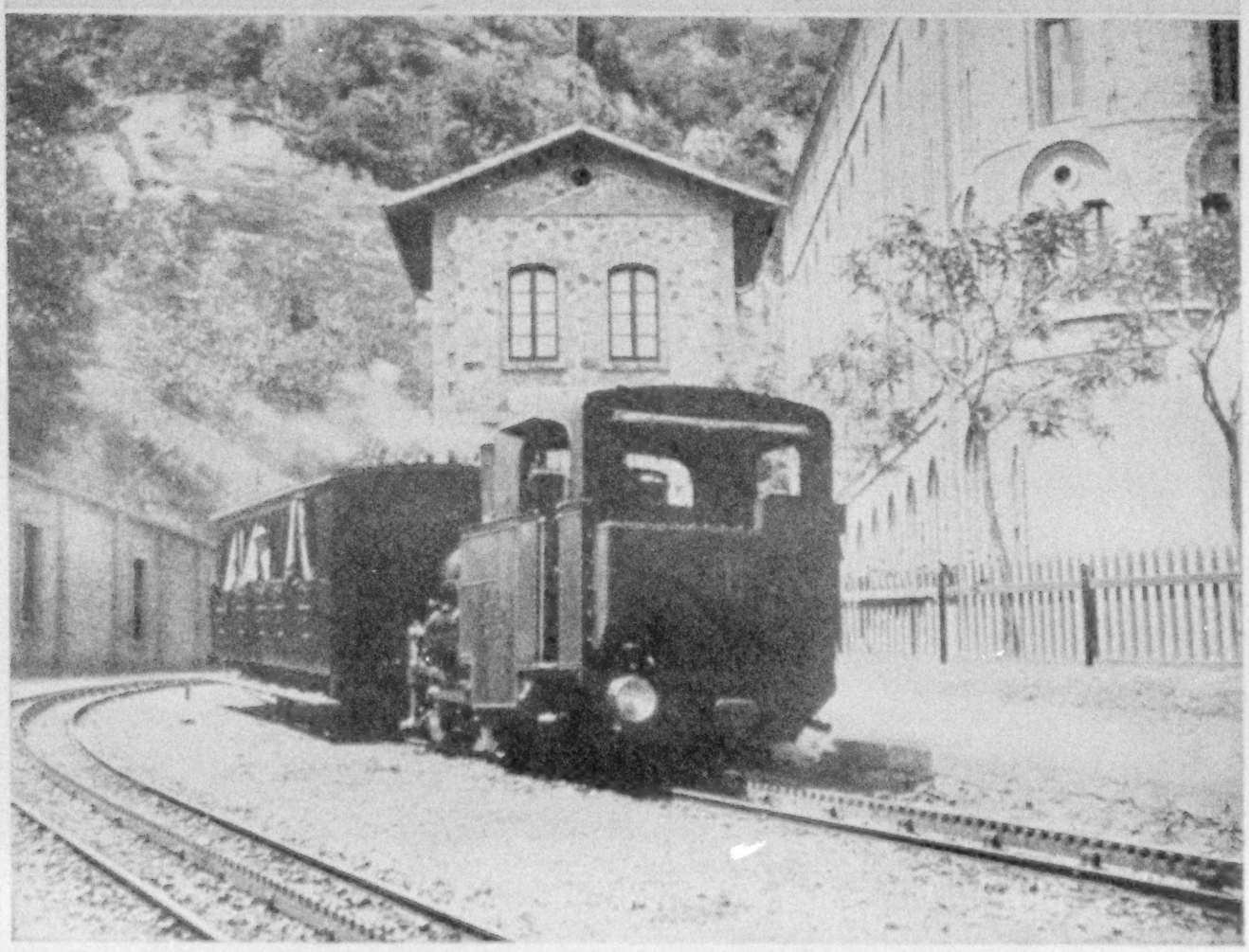


AN OLD BAPTISTRY AT GERONA, NOW USED AS A LUMBER ROOM



THE RUINS OF A ROMAN AQUEDUCT AT TARRAGONA, WHICH WAS THE CHIEF CITY OF ROMAN SPAIN

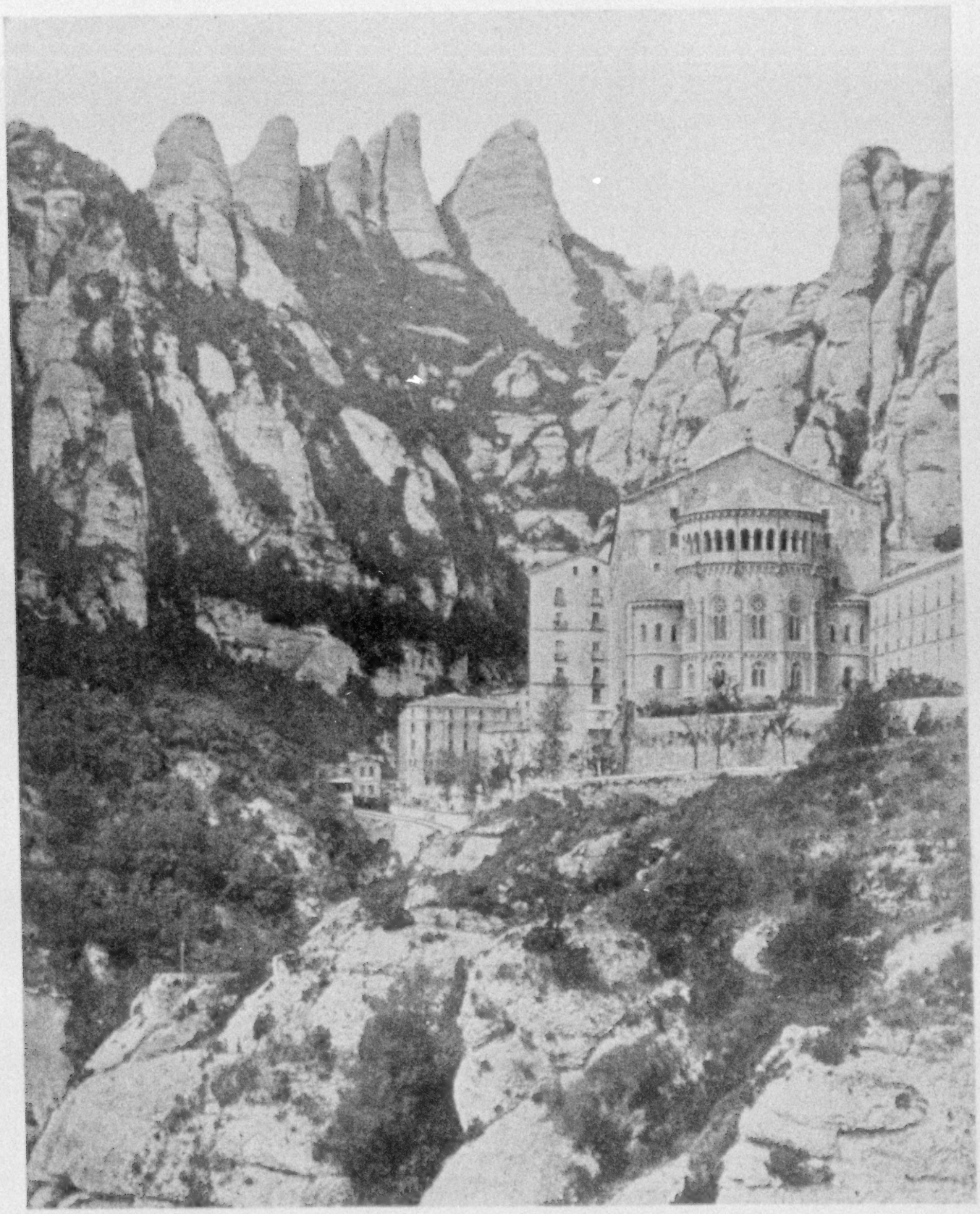
THE REMAINS OF ANOTHER ROMAN AQUEDUCT: MERIDA (SEE PAGE 205)



ALI BABA JARS AT TORTOSA (SEE PAGE 193)

It was in jars like these that Ali Baba concealed his Forty Thieves

COG-WHEEL RAILWAY UP THE MONTSERRAT (SEE PAGE 195)



THE MONASTERY OF THE MONTSERRAT (SEE PAGE 195)

Photo by Louise Coleman

THE PUBLIC FOUNTAIN IN A SPANISH TOWN

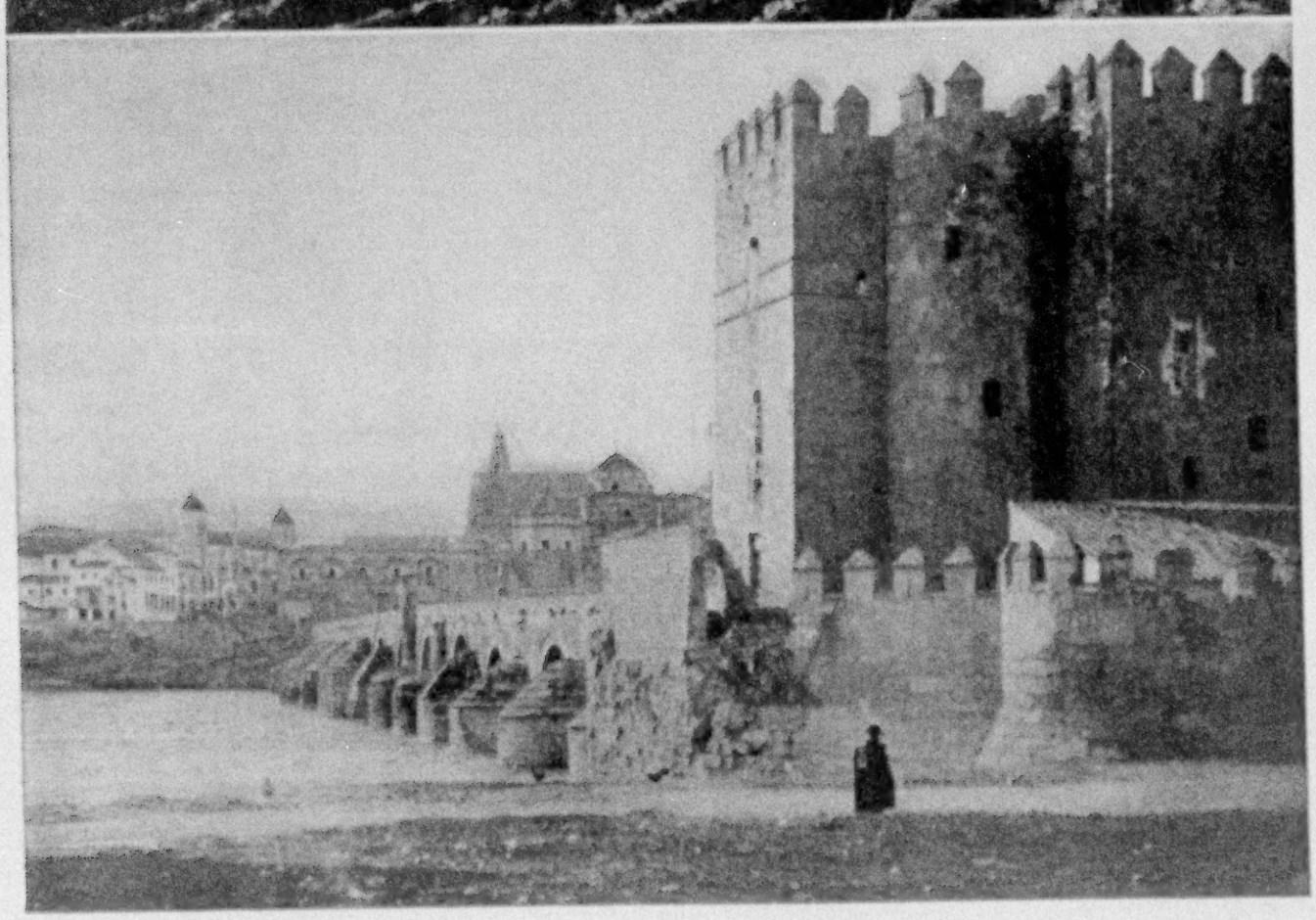
dore; the saint's relics were brought here in 1063 by Ferdinand I of Castile and León.

At the end of the main street, with its lively groups and here and there an ox cart, is the famous cattle market. The mouse-colored oxen are short-horned and much like ours; they are yoked by the horns; skins are used to keep the yoke from galling. In another part of the town a general market is held Saturday mornings. The square is crowded with booths and with peasants buying and selling. The section devoted to local pottery is especially interesting. The peasants dress largely in homespun—they still practise the household arts in Spain. The men wear knee-trousers, and one sees here, as in many parts of Spain and our own Southwest, the *alpargatas*—low canvas shoes with hempen soles.

The Guadarrama Mountains, running across the Castilian tableland, overlook the Escurial, Philip the Second's imposing palace. This was his hobby; to it he devoted millions of dollars, at a time when he was often at his wit's end for money. In its wild, rocky surroundings the enormous pile is extraordinarily impressive. Within, one is shown the funeral niches where rest the kings and queens of Spain, and the chamber where Philip himself died of a loathsome and lingering malady.

More interesting, perhaps, is the wonderful collection of manuscripts. In spite of disastrous fires, the Escurial remains one of the world's great libraries. Many of the manuscripts are illustrated. In one we see our first parents, as a tenth-century Spanish monk pictured them; they eye one another with recriminatory glances; but the serpent, twined about the tree, leaves no doubt who was guilty. Another manuscript, written in 1047, has as its frontispiece the Cross of Oviedo—the Christian symbol in the

SHEPHERDS AND THEIR FLOCKS OF MERINO SHEEP IN CASTILE

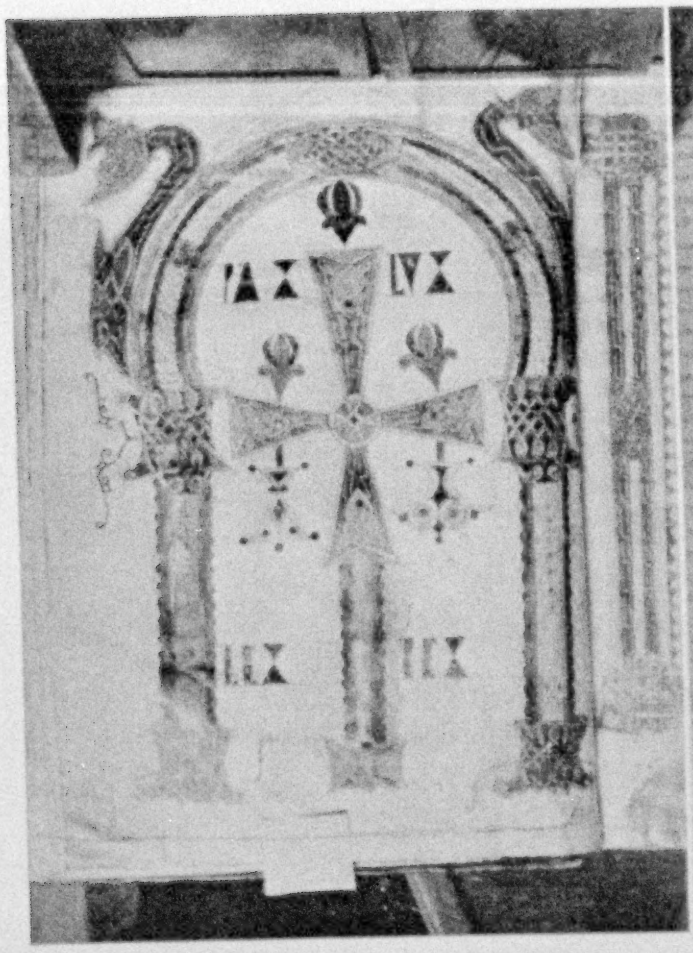


MOORISH BRIDGE AT CORDOVA (SEE PAGE 205)

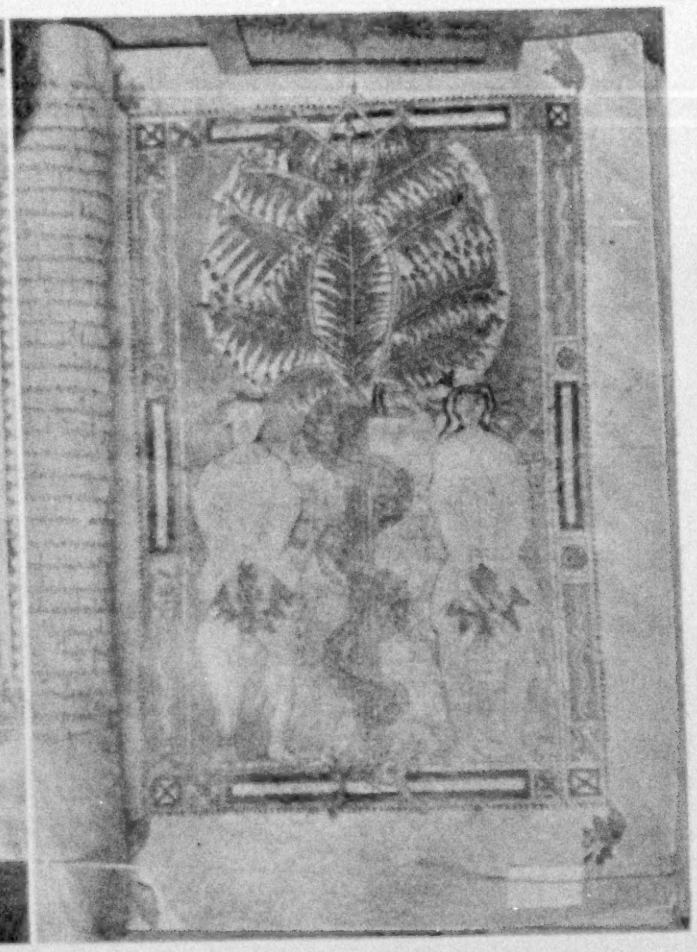
XUM

CASTLE OF SAN SERVANDO: TOLEDO

THE ESCURIAL, BUILT BY PHILIP II (SEE PAGE 200)



CROSS OF OVIEDO: ILLUSTRATIONS FROM OLD MANUSCRIPTS IN THE ESCURIAL



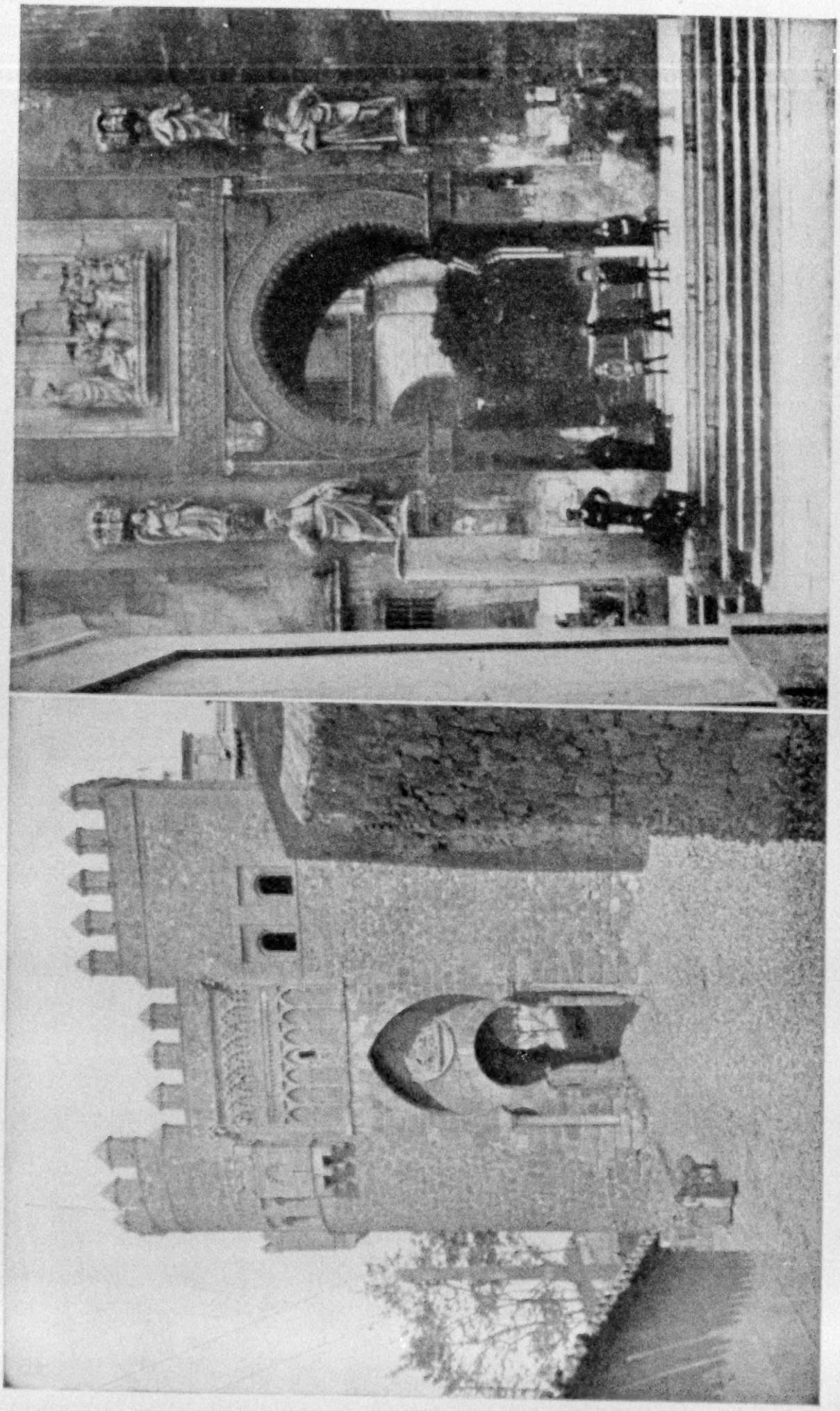
OUR FIRST PARENTS AND THE SERPENT AS PICTURED BY A SPANISH MONK OF THE TENTH CENTURY (SEE PAGE 200)

fight against the Saracen—with Alpha and Omega hanging from it.

Madrid is a well-built, modern city with busy offices and bustling trolley cars. Like our own capital, it is an artificial city, depending upon the government, tourists, and society for its subsistence. Its picture gallery, in the Prado, is the peer of any in the world, and must be visited by students of Titian, whose paintings here preserved rival those of Velasquez in beauty and interest.

A greater attraction to the populace is the huge bull ring, seating nearly 15,000. On Sunday afternoons a gay throng gathers there; the bull-fighters march out in their brilliant costumes, and the ceremony of slaying the bull begins. It is almost a ritual, and every detail must be punctiliously observed. First, the bull is made to charge the horsemen, the *picadores*, who jab him with short-pointed spears; the horses wear a blinder over one eye, so that their rider can keep them from seeing the bull's onset. If they are not killed at once when the bull gores them, they are sewed up and made to meet another attack. This is the revolting part of it. After enough of this, nimble *banderilleros* throw their darts into the creature's neck and shoulders at just the proper place and interval. These men, and the *espadas* who follow them, show great dexterity and grace. The *espada* is a seasoned bull-fighter; his function is to plunge his rapier into the bull's heart, and his calmness as he maneuvers the beast into a favorable position, teasing him the while, is fascinating to watch. The audience, with eyes keen as hawks', applaud every good stroke, and hoot in derision at any misplays.

The net influence of the sport is demoralizing, and much of the best element in Spain is against it, unless it can be

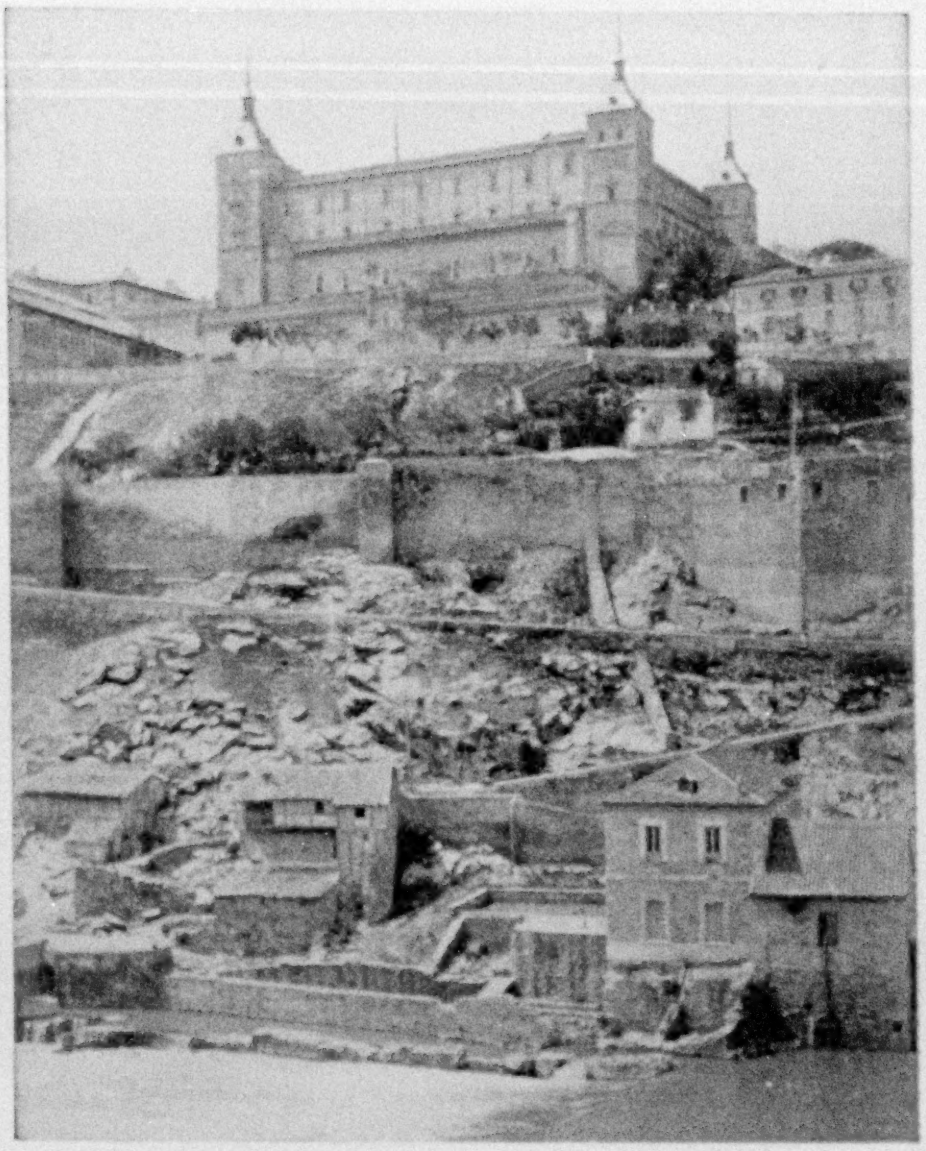


GATE OF PARDON: SEVILLE (SEE PAGE 208)

PUERTA DEL SOL: TOLEDO (SEE PAGE 205)

reformed; but the same can be said of our present form of football, and the one is as likely to disappear as the other. The same arguments are heard in Spain in favor of bull-fighting which are used here for football—it makes the participants brave, alert, quick to act and to help out a fellow-fighter; but at least the bull-fighters maul only animals, not their fellow-men. A Spaniard considers the latter brutal.

Not far from Madrid lies Toledo, the ancient Visigothic capital. The Tagus flows about it in a deep gorge on almost every side. High above the old mills looms the Alcázar, the one-time castle, now a military school. Toledo is a fascinating city, with narrow, winding streets, and shops where one can still buy Toledo blades, tempered in the Tagus, and inlaid with gold. Down its widest street, in which two carts can actually pass, rises the great Gothic spire of the cathedral, which replaces the Moorish mosque. The main square, the Zocodover, keeps the Arabic word *zuq* (market) in its first syllable; one of the Moorish gates, the Puerta del Sol, of 1100, is still intact; and in the Casa de Mesa are beautiful Moorish arabesques and tiles, nearly 500 years old.

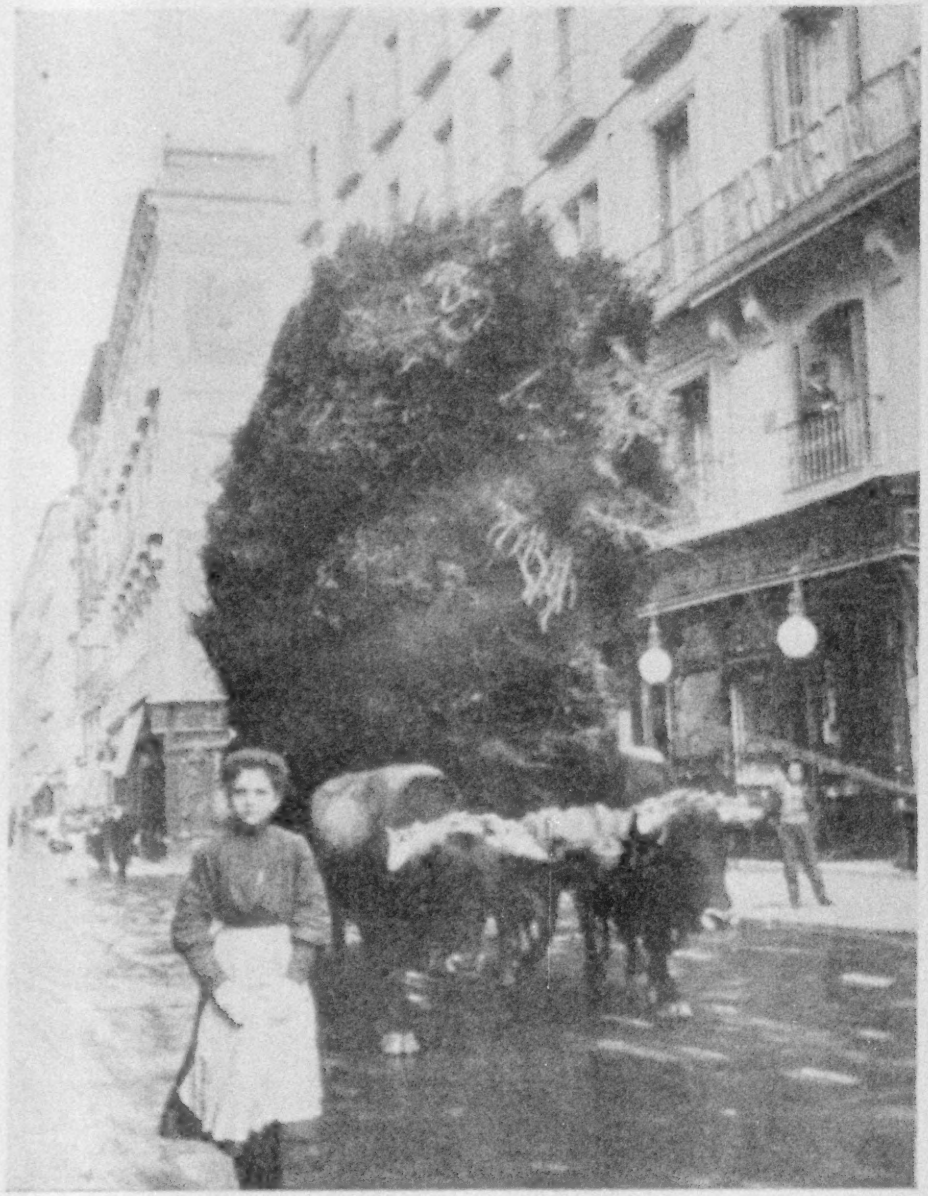


THE ALCAZAR OF TOLEDO, ONCE A FAMOUS CASTLE, NOW USED AS A MILITARY SCHOOL

Beside the city shepherds drive their parti-colored flocks along the highway; above rises what is only too truly a type of "castles in Spain"—the dismantled fortress of San Servando.

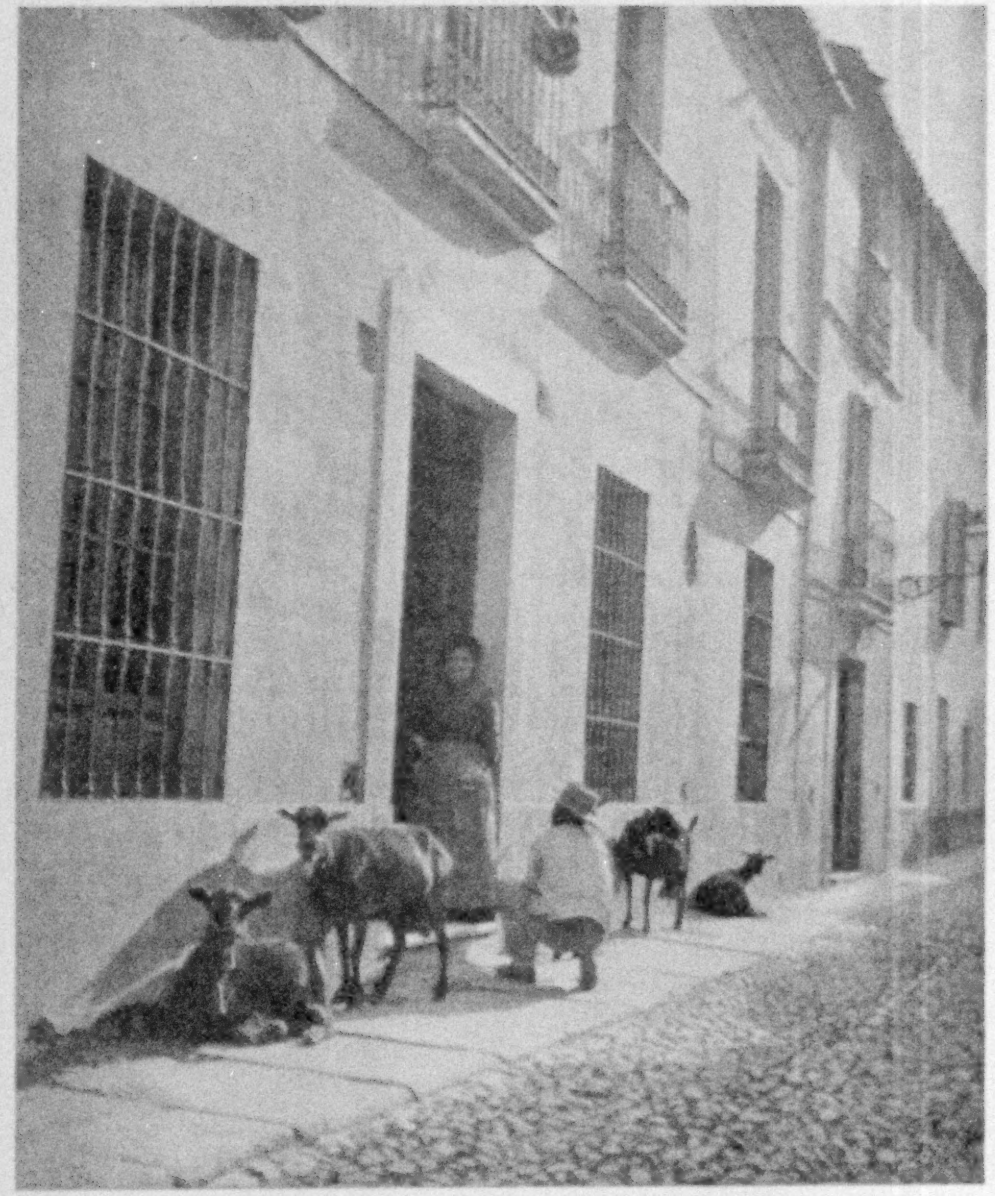
A day's journey to the southwest lies Mérida, once a Roman metropolis. It still possesses Roman bridges and its ancient theater, and outside the city are still standing several arches of the old Roman aqueduct—"Los Milagros" (the miracles) they are called by the peasants, and it is a miracle that this arcade remains, after so many centuries of earthquakes and invasions. On top of the aqueduct storks, sparrow-hawks, and black-birds nest together in apparent amity.

At Cordova one enters southern Spain, with its highways bordered with aloes and prickly pear (both American importations, like tobacco, maize, and potatoes), and its groves of olive trees. Spain leads the world in the production of olive oil; but it is mostly refined for export in France and Italy; Spanish wines are also largely altered abroad for the consumer's palate. One of Spain's



IN MADRID

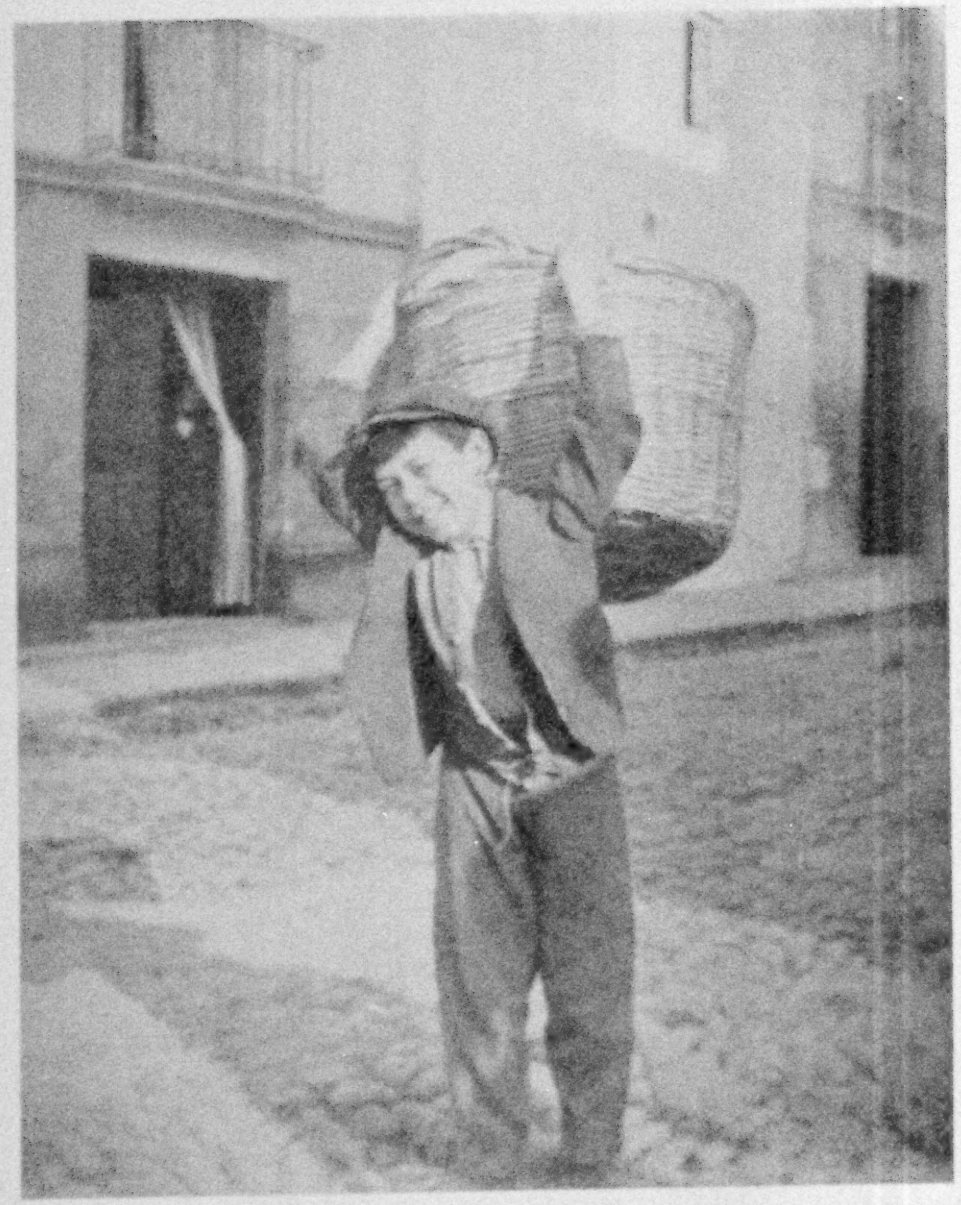
Photos by Louise Coleman



THE MILK-DELIVERY SYSTEM OF GRANADA

ANOTHER SPANISH FOUNTAIN

Photos by Louise Coleman



A SPANISH BOY

THE FOREST OF PILLARS IN THE MOORISH MOSQUE AT CORDOVA

great needs is capital and enterprise to elaborate these products at home. She has cheap and willing labor, as our Vermont quarries can testify; Barre and Montpelier are full of Spanish workmen.

Cordova lies on the Guadalquivir, here crossed by a Moorish bridge on Roman piers; the Moorish keep is still preserved. A thousand years ago Cordova was the intellectual and artistic center of western Europe; its university drew students from everywhere, and its products, especially leather (cordwain, *i. e.*, Cordovan), were famous. Today its narrow and sunny streets, with their picturesque churches, seem deserted; but the cathedral chapter has preserved one memorial of past magnificence in the Moorish mosque, the greatest Mohammedan building west of Mecca. Entering its precincts by the Orange Court, one finds the portal flanked by two Roman milestones. With exquisite taste the canons have set to the left one dating from the year of Christ's birth; to the right, from that of the crucifixion. Thus they typify Christianity's conquest of both the Roman empire and Mohammedan Moor.

The mosque itself is a forest of pillars, which divide the huge, low building into a score of naves. There are over 900 of these columns; some were sent here even from Constantinople, mates, perhaps, of those sent at the same time to Charlemagne for his palace at Aix-la-Chapelle. Those were the days of Haroun-al-Rashid and the Arabian Nights; but the splendor of Cordova rivaled that of Bagdad. Abderrahman's wonderful palace—far more sumptuous than the Alhambra, to judge from the descriptions of the Arabic historians—has perished utterly; but the mihrabs, or prayer niches, in the mosque give some idea of the beauty of Cordova at the height of her glory.

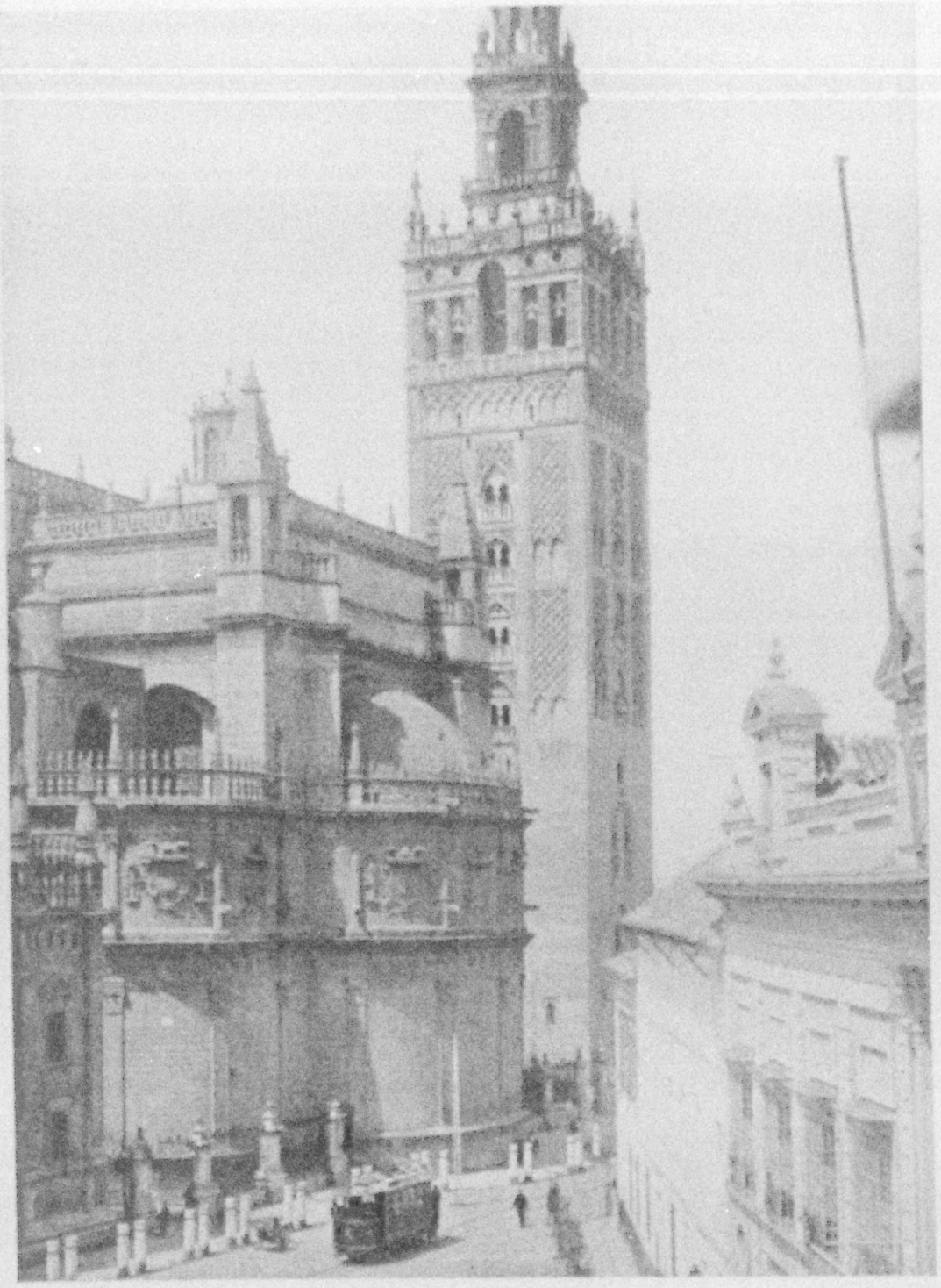
Descending the Guadalquivir, one feels the Moorish presence on all sides. The men who sit idle in the market-place, the women who bring their graceful jars to draw water, often have strongly Moorish features, and with good reason, for the Moors held the kingdom of Seville for over 500 years.

The proudest memorial in Seville is the lofty Giralda, once the muezzin-

MOORISH TYPES

AT A WAYSIDE TROUGH

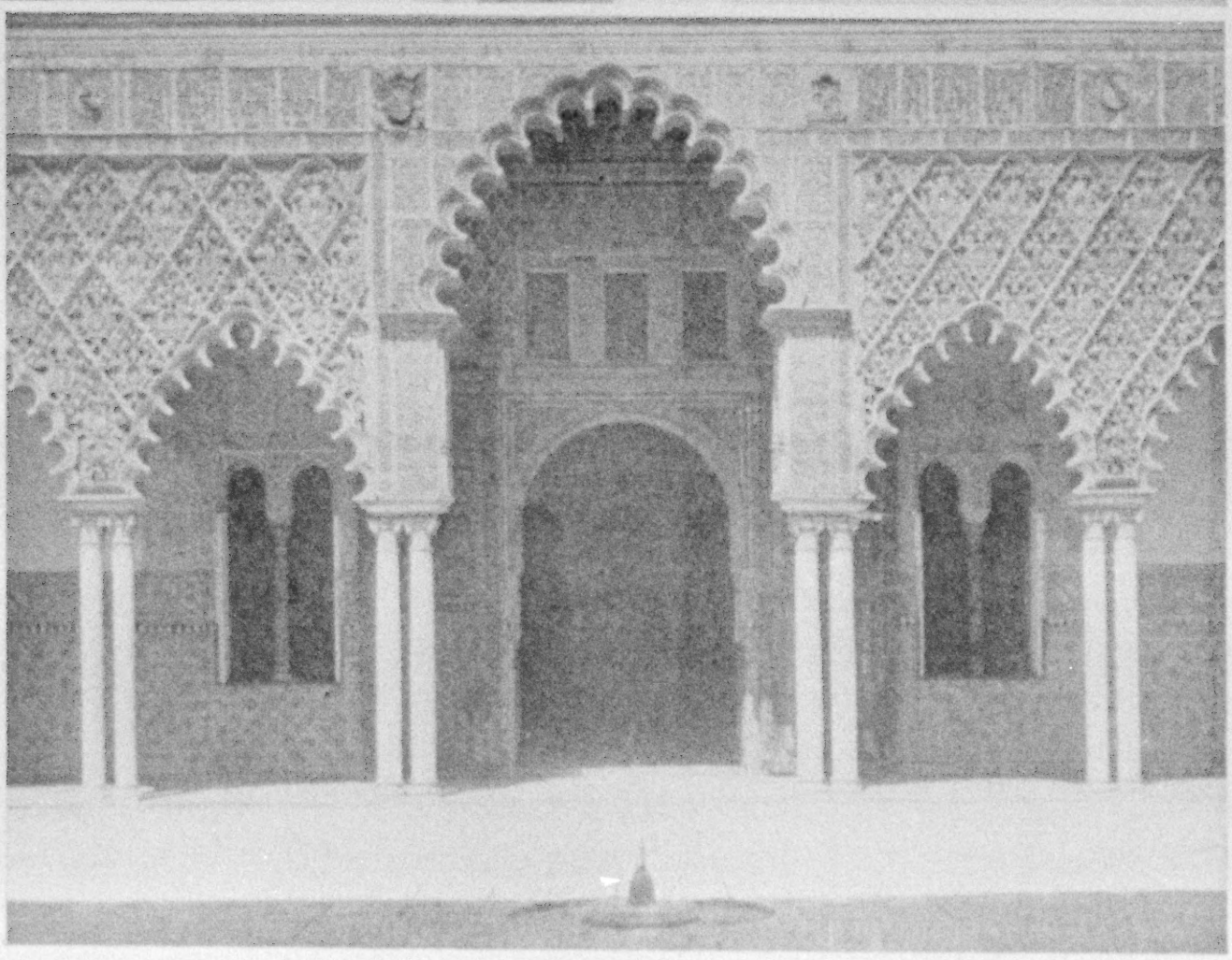
XUM



THE GIRALDA: SEVILLE (SEE PAGE 208)

tower of the mosque. Finished in 1196, it rises 300 feet above the street. The ascent is easy, up a corkscrew inclined plane, and the view down upon the massive cathedral and over the city and plain is most impressive. The great bells swing and clang from time to time, scaring away the myriads of little sparrow-hawks which make their home here. The Orange Court of the cathedral keeps its Moorish Gate of Pardon; but the mosque, which vied with that of Cordova, was razed to make room for the noble Gothic cathedral.

Not far away, however, the Moorish Alcázar is still preserved as a royal palace. Though built by Christian kings of Castile, its architects were Moors, and they employed all the delicate refinements of their art. Standing in the Court of the Damosels, where Charles V married Isabella of Portugal, one can hardly be-



UP THE DARRO VALLEY: GRANADA

COURT OF THE DAMOSELS: ALCAZAR, SEVILLE

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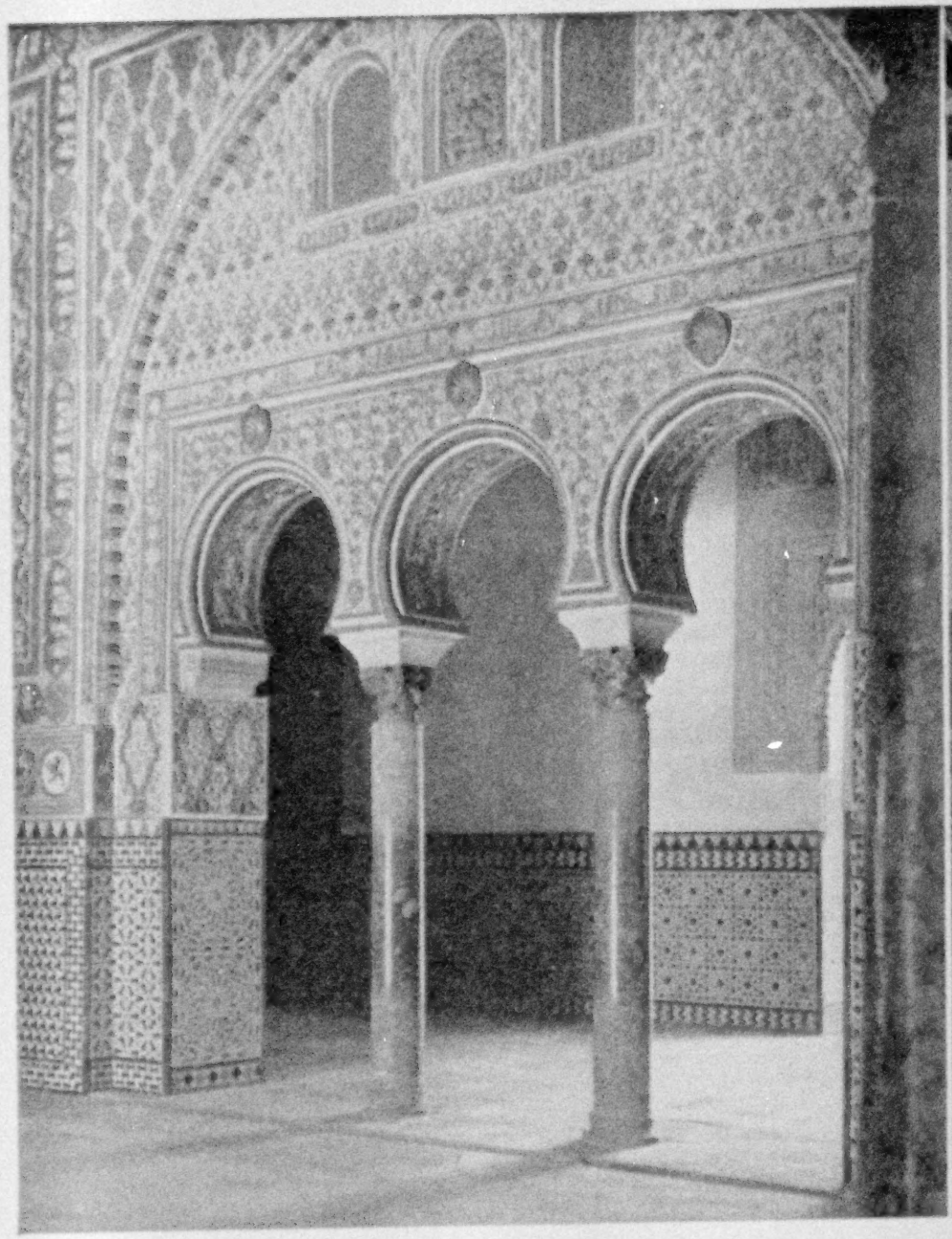
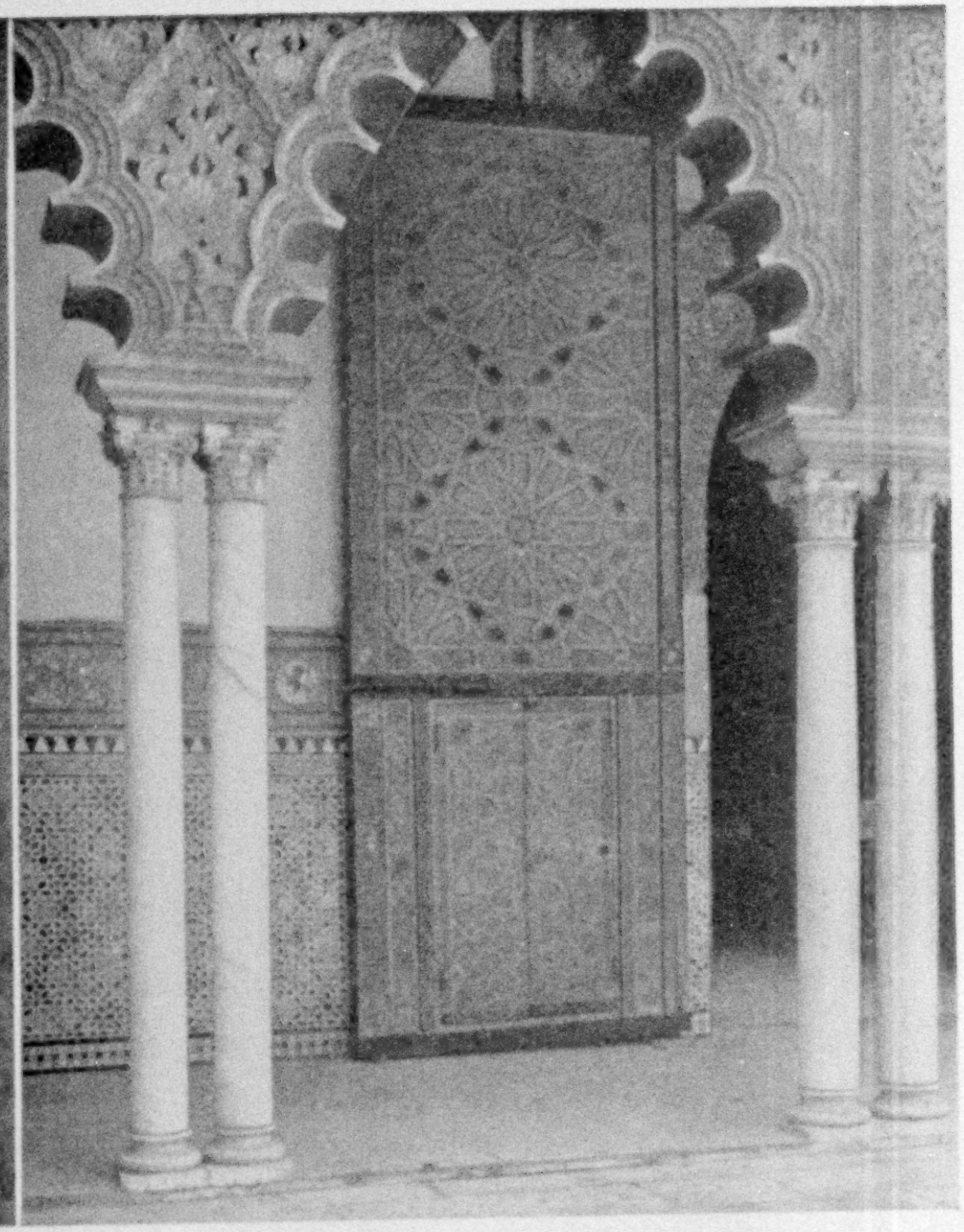


SALOON OF THE EMBASSADORS: ALCAZAR, SEVILLE



A DOOR IN THE COURT OF THE DAMOSELS

HIGHWAY ABOVE CORDOVA LINED WITH ALOES AND PRICKLY PEARS

STAGE-COACH: SAN FERNANDO TO ALGECIRAS

SPANISH CHILDREN

lieve that this stone lace-work is merely a stucco cement, molded and fastened upon wood. Very beautiful are the dados of enameled tiles, or *azulejos*, and the folding doors are marvels of Arab carpentry. The horseshoe arcades of the Saloon of the Embassadors are the most graceful and ornate in Spain.

Granada, long a decaying provincial city, is now alive with trolley cars and electric lights, and tourists are so common here that the small boys have even learned a few English words with which to coax away small coin. But the herds of goats, and an occasional cow—an economical milk-delivery system—give a pastoral touch to the town. One sees the same thing at Naples, and the Neapolitan milkman has even discovered a unique way of increasing profits. Under his coat he puts a hot-water bag, with a long rubber tube running down his coat sleeve, and, as he milks, he injects into the pail that percentage of *aqua pura* which milkmen of all ages and peoples have found desirable.

Granada lies at the point where the Darro and the Xenil, running down from the mountains, unite as they enter the fertile plain of the Vega. Above the city rise the foothills—one crowned by the Alhambra—and beyond them the snow-capped ridges of the Sierra Nevada, 10,000 feet higher. Granada has, therefore, a singularly beautiful situation, and it enjoys a mild and agreeable climate. The romantic interest of its history completes the spell. Here was the last Saracen court in western Europe; here Isabella of Castile, with the money loaned her by a Spanish Jew, financed the Genoese adventurer's foolhardy quest; here Ferdinand and she, in that same momentous year of 1492, decreed the expulsion of the Jews from Spain; and here their ashes now repose, in the great Renaissance cathedral which they built in gratitude for their triumph over Islam.

Strolling first up the Darro Valley, between lines of whitewashed houses, glaring in the spring sun, one soon reaches the gypsy quarter. These nomads, whom George Borrow sketched so intimately, have settled here in cave-dwellings among the aloes and Indian figs, and issue forth to meet the tourist with guitar and invitation to a dance. Beyond lie bare hills, from which a wonderful view may be gained.

The Alhambra looms up over the valley, commanding the city and the nearer plain; like the Parthenon, its strategic value led to its undoing. But, ruinous though it is, the Alhambra remains the best western reminder of Saracen culture and magnificence. Its Myrtle Court, with a sunny pool, leads to the main enclosure, the Lion Court, off which open the gorgeously decorated rooms which Irving has immortalized. Every detail is worth noticing; the dados, with their varied tile designs; the ornamental friezes, in which verses, often from the Koran, border intricate arabesques; the beautifully fretted arches and the delicate Moorish windows. What remains is so exquisite that one hardly dares imagine its original grandeur.

The trip from Granada to Gibraltar is now easily made by railway; but no one

knows Spain who has not taken a stage ride over its breezy plains and aromatic hillsides. The ride from San Fernando, near Cadiz, to Algeciras, across the bay from Gibraltar, is a fascinating experience. Relays of four or five horses rush the coach along over good roads at a steady trot, below Moorish wind-mills, past ruined castles, and beside wide marshes, where storks, cranes, herons, flamingoes, and wild fowl watch its progress. Everywhere the perfumed breeze pursues it, under the brilliant blue of the southern heaven. Now it skirts the seashore, looking over the strait to the forbidding African mountains; now it toils up bleak hillsides, brilliant with the yellow of the fragrant broom. "Pepe," the driver, handles the clothesline reins for all the 60 miles; his postilion occasionally hurls a stone artistically at one of the leaders, to bring him to reason; but in general Pepe drives with his voice, bestowing encouragement and malediction at the top of his lungs upon each of the horses by name; and better driving it would be hard to find.

At the relay stations, a half dozen in number, there are waits of 20 or 30 minutes, in which one can stroll about, watch the larks and countless other songsters, and pick the tiny blue irises and other charming wild flowers. As the coach carries the mails, it is constantly accompanied by one or more civil guards, as the Spanish gendarmes are called. In their striking hats, they are remarkable figures, especially in combination with the herdsboy, whose sheep and goats are browsing under the olive trees.

This ride has an added charm in its historical associations. Within a mile or two of the road are the battle-fields of the Salado, where the Visigoths vanquished the Vandals, in 417, and drove them over to Africa, and where, also, in 1340, Alfonso XI defeated the Moors, in the first battle in Europe, it is said, in which Damascus cannon were used. Near by is the Laguna de Janda, where, in 711, the great battle began in which the Moors won Spain from Roderick and his Visigoths. One of the stops is the picturesque city of Tarifa, where Guzman el Bueno saw his own son slain before his eyes rather than give up the castle to a traitor; and from Tarifa's Alcázar one can see Trafalgar, off which England won the empire of the seas. As the stage, after passing the Moorish aqueduct, draws up at Algeciras in the early evening, the search-lights from "the Rock" remind one again of the consequences of that battle.

"Quien dice España, dice todo"—he who says Spain, says all. And, indeed, Spain has everything, from snow-clad peak and wind-swept *mesa* to fragrant orange groves and waving palm trees. If the traveler comes to her to learn, she sends him away richly rewarded, and her austere charm will surely draw him back.

A NEW NATIONAL PARK

By Guy Elliott Mitchell, U. S. Geological Survey

THE nation that leads the world in feverish business activity requires playgrounds as well as workshops, says George Otis Smith, which is but an application to America of the old saw that all work and no play makes of Jack a dull boy. When Secretary Seward was endeavoring to enlist the support of the people for his project to purchase Alaska one of the somewhat æsthetic arguments by which he sought to gain advocates was that this great northwestern territory should be acquired if for nothing else than that it would afford a magnificent summer playground for the American nation. Alaska's purchase is doubtless justified on this score alone, and, while its varied topography affords in truth a wonderful field to the tourist, there are much more readily accessible

"playgrounds" within the United States. Indeed, some lie at our very doors, although for lack of good transportation facilities they may be more difficult of access than far distant points.

The nation owes it to itself, to the people of the present day, and even more to those of a future congested population to create into national parks the magnificent regions of the Rocky Mountains and the High Sierra, which have little, if any, economic importance, and thus preserve always their natural, wholesome beauties. Transportation methods will quickly follow and thus new "playgrounds" become accessible.

A NATIONAL PLAYGROUNDS ASSOCIATION

A national playgrounds association for grown-ups, organized on some such basis as that of the Sierra Club of California, but with the United States for its field of activities, would find important work to be done and would enlist many ardent supporters. Numerous national parks have already been established by the government, some because of their recognized standing as natural wonderlands, such as the Yellowstone, and others through insistent championship of enthusiasts.

The youngest member of the playground family, now knocking at the door for national protection, is the proposed Glacier National Park in northern Montana. There are some people in the East who do not even know that there are glaciers in the United States today, but think of them as extinct monsters belonging to a past geologic era. To such the very name, Glacier Park, is an education. There are no longer, it is true, vast continental glaciers; even the great frozen regions of Alaska are small in extent compared with the ancient glaciers, but the remnants of the one-time universal ice-sheets, such as can be seen in Glacier Park, are so majestic and numerous as to awaken in the mind of the traveler sentiments of unbounded awe and wonder at Nature's matchless handiwork.

"Give a month at least to this precious reserve," says John Muir, some ten years ago, in speaking of the delights of this region. "The time will not be taken from the sum of your life. Instead of shortening it will indefinitely lengthen it and make you truly immortal."

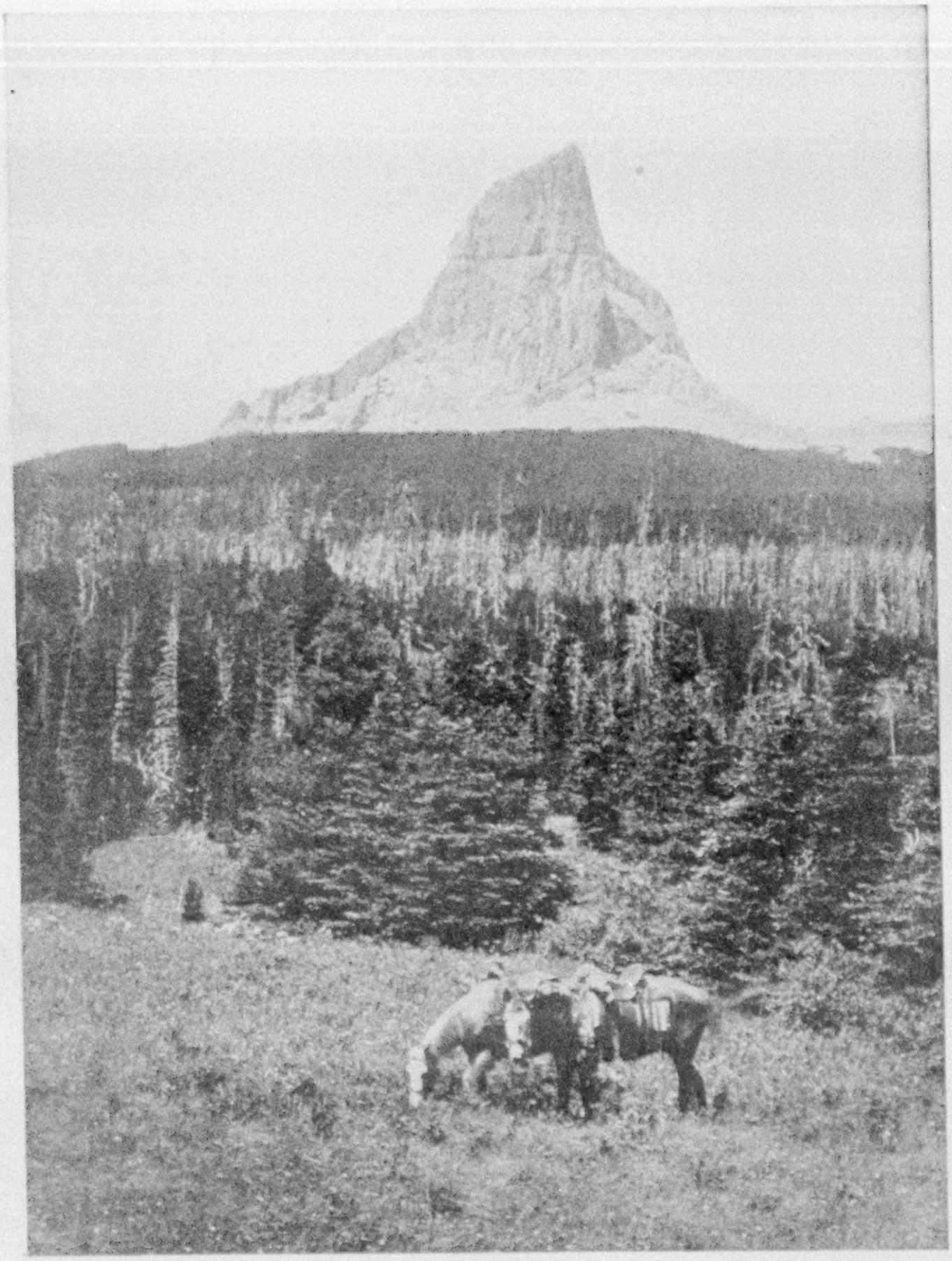
Nor are the attractions of the Glacier Park region confined to the scenic. Here lies, for instance, the majestic Lake McDonald, full of brisk trout, as described by Mr Muir, in the heart of the splendid Flathead forests of giant pine, spruce, and cedar, while 10 miles above is Avalanche Lake, shimmering at the foot of a group of glacier-laden mountains. Far up the white peaks one can hardly fail to meet the white goat or American chamois, while in other retreats dwell deer, elk, and bear and many smaller, sleek-furred animals enjoying their beautiful lives in company with numerous bird species.

It is hoped that the present session of Congress will preserve for the nation this latest playground and constitute it another of our national parks. It will then be our second largest park, surpassed only by the Yellowstone.

FAVORABLY REPORTED IN CONGRESS

The Sixtieth Congress made a favorable report on a glacier park bill, which had also the strong support of the Secretaries of the Interior and Agriculture. This report was based largely upon a topographic survey made four years ago by a United States Geological Survey party, and upon a later compilation by Robert H. Chapman, one of the party, embracing a total area of about 1,000,000 acres lying just south of the Canadian line and between Flathead River and the Blackfeet Indian reservation. This area contains 60 or more true glaciers, ranging in size from small glaciers of a few acres each to those covering 5 square miles. It also contains over 250 glacial lakes from a few hundred feet to 10 miles in area.

The Rocky Mountain system in the United States abounds in regions of wild and magnificent scenery, but it is doubtful if any of them surpasses in grandeur



CHIEF MOUNTAIN, 10,000 FEET ABOVE THE SEA: A LANDMARK FOR AN EXTENSIVE AREA OF THE PLAINS

It is a turning point in the boundary between the Blackfeet Indian Reservation and the Forest Reserve

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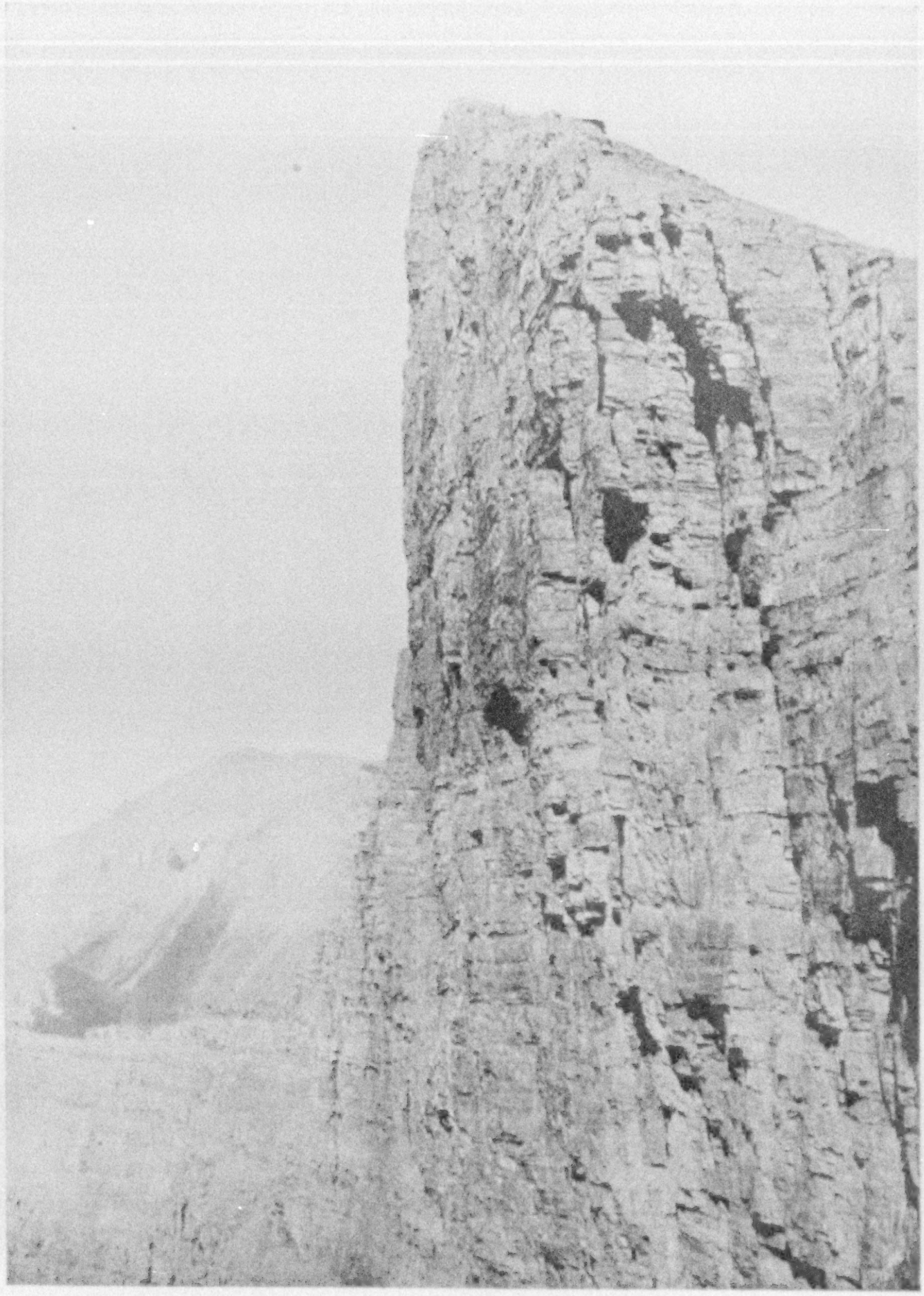
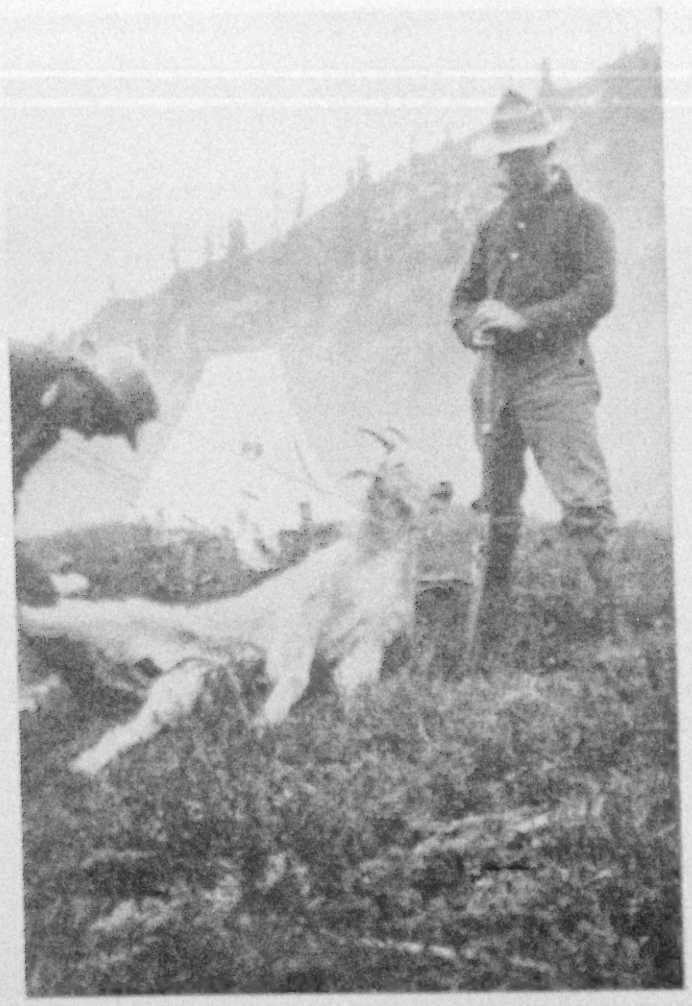


GOATHAUNT PEAK: A SPUR OF MOUNT CLEVELAND, LEWIS RANGE
A 2,400 foot vertical limestone cliff. Goat trails extend across the cliff face

and interest that of Glacier Park. From its area water flows to Hudson Bay, the Gulf of Mexico, and the Pacific Ocean. Mount Cleveland, its highest peak, reaches an elevation of 10,434 feet, and there are many other rugged mountains ranging from 6,000 to 10,000 feet above sea-level. This area of the Northern Rocky Mountains, says Mr Chapman, which lies to the north of the Great Northern Railway and to the south of the Canadian boundary, is one of the most beautiful mountain regions in the world. Approaching the divide from the plains region to the east, the mountains present to the traveler a rock wall of great steepness extending northwest by southeast for unbroken miles except where cut by deep U-shaped canyons. These have been largely formed by the great glaciers which once slowly flowed from the mighty snow-covered peaks and ridges forming the divide between the drainage of the Atlantic and the Pacific oceans—the northern Continental Divide.



THE WHITE MOUNTAIN GOAT

An animal delighting in the most rugged topography; yet in the greatest danger of extermination, unless protected in its natural breeding places.

FED BY GLACIAL ICE

Deep in the canyons are roaring streams, coming from the melting ice and snow and flowing into placid mountain lakes and thence into the arroyos of the plains below. Between the canyons the long finger-like ridges rise to considerable heights, the timber-covered slopes ascending steeply until a region of brush-grown broken rock is reached, which in turn leads to the base of precipitous cliffs. The canyons at the head usually terminate in great amphitheaters, rising cliff over cliff in a stairway of tremendous proportions. Many of the steps of these giant's stairways retain ice masses which slowly flow across them, each fed from a large ice mass above until a region of huge snow-banks is reached.

The main Rocky Mountain mass is actually made up of two principal parallel ridges, the Lewis and the Livingston ranges, which run approximately through the center of the proposed park. These ranges are the remnants of what was once a much wider plateau-like region of rock, which, however, has been mightily carved and shattered by the forces of erosion, principally those of the great ancient glaciers. Resting upon this great mass are the higher peaks, huge pyramids and blocks, with cliffs and precipices of hundreds and sometimes thousands of feet, plunging away down to the roaring streams of the canyons, or ending in the great crevasse at the head of some glacier.

To the westward the mountains break precipitously, and from the foot of the steep, long, timber-covered ridges reach out toward the valley of the Flathead River. Between these ridges and extending up the canyons of the higher range are many miles of lakes, joined by rushing streams similar to those on the eastern side.

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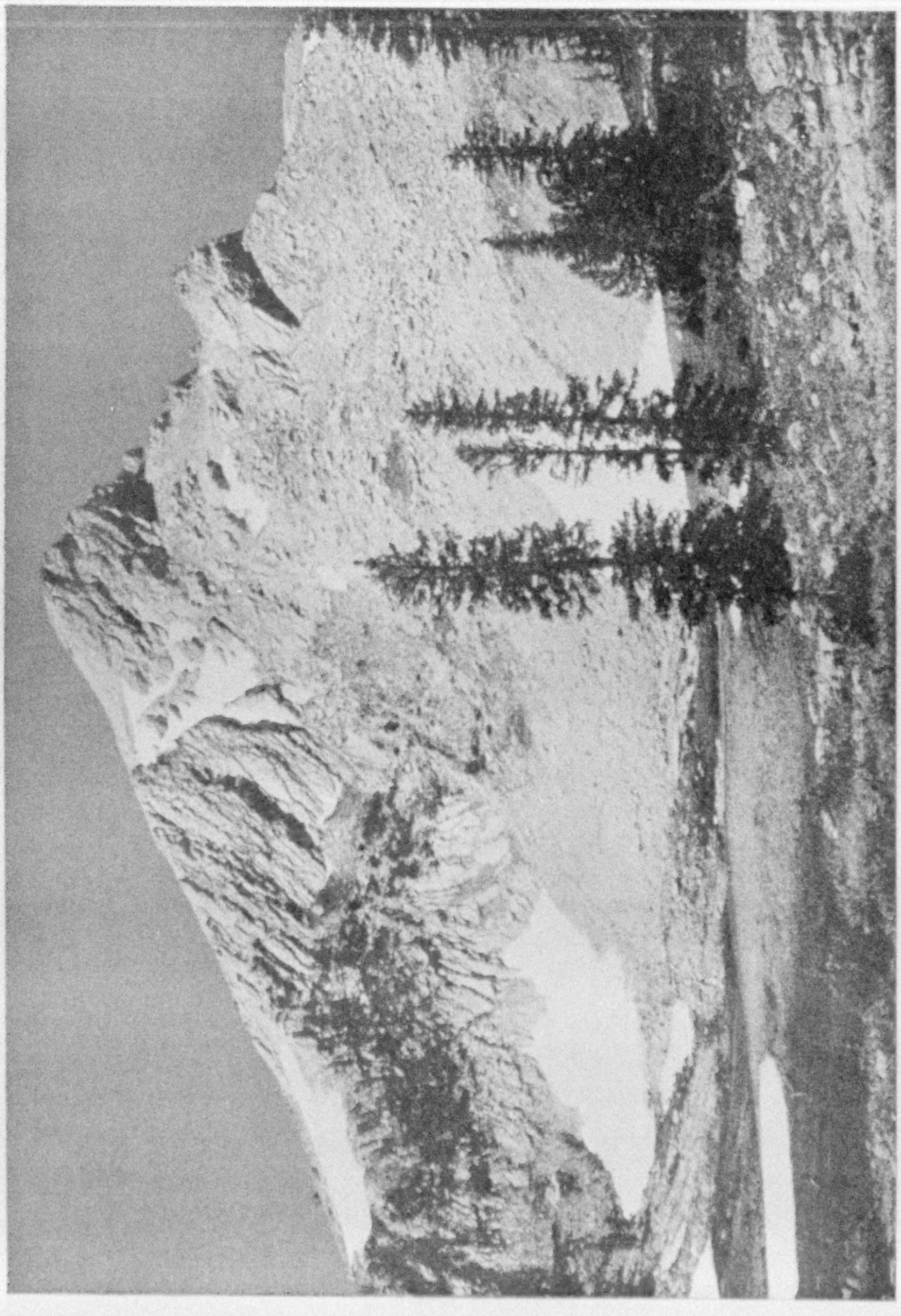


THESE GLISTENING, BARREN PEAKS, ALMOST AS WHITE AS THE SNOW BANKS WHICH COVER THEM, IN PLACES RISE FROM A PLATEAU WHICH IS ITSELF ALMOST AS BARE

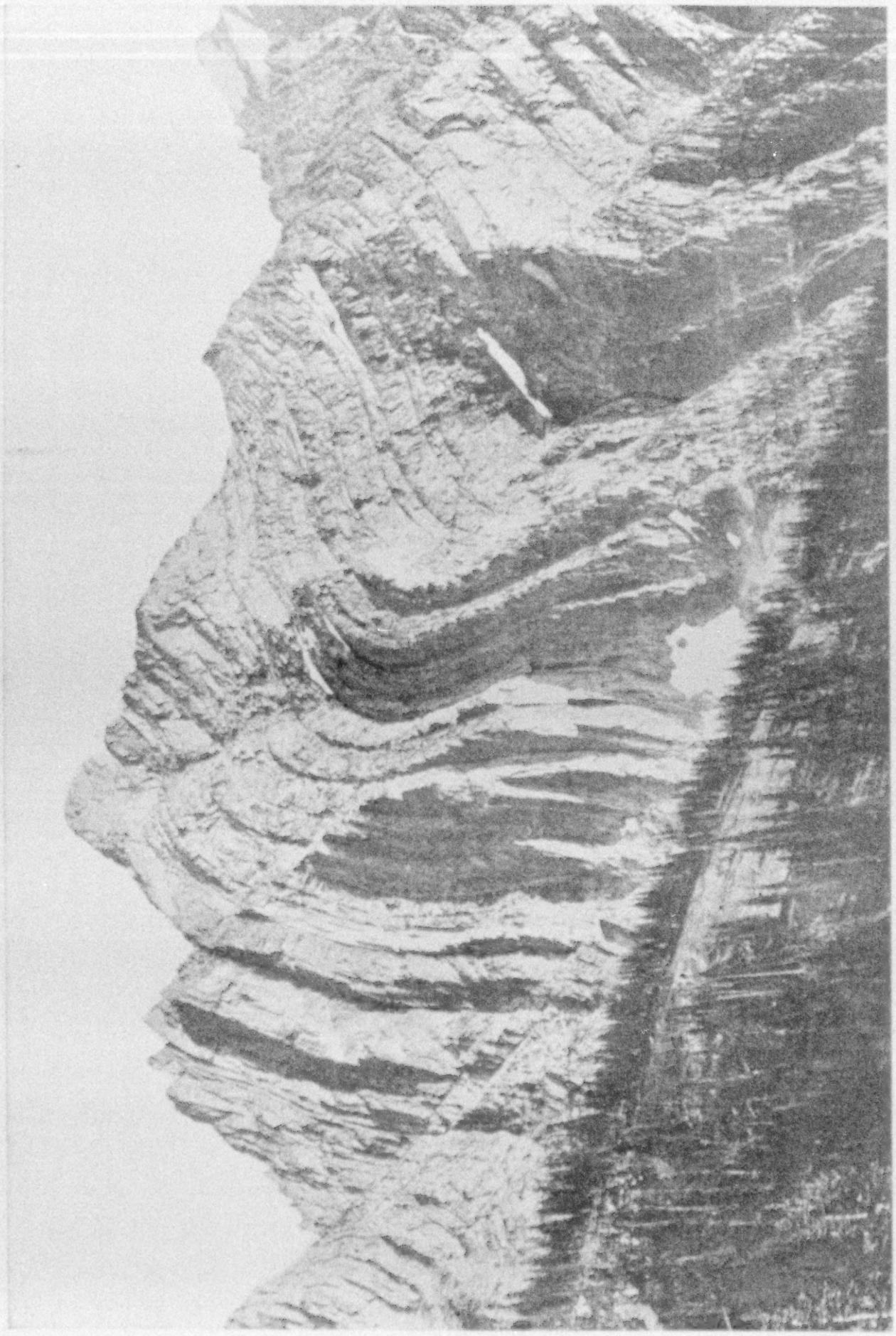
MISSION RIDGE, MONTANA: GEOLOGICAL SURVEY TRIANGULATION PARTY
In high mountain regions, October snows are likely to be from two to four feet deep

THE PARADISE OF BIG GAME

The whole park is inhabited by wild animals and birds, and the streams and lakes abound in many kinds of fish. In the higher barren rock areas the white goat is found in great numbers, while on the slightly lower ridges, where some protection is afforded by stunted timber growth and brush and jagged slopes, the Rocky Mountain sheep, or "bighorn," has his haunts. In the valleys and on the lower spurs are many white-tail and black-tail deer and moose; in places a few elk are found, and over the whole area, from high glacier and snow-field to huckleberry-bush region of valley and flat, roams the giant grizzly bear.

All the game animals use the higher mountain districts for summer range only, as the area is too high and the snowfall too heavy to permit of winter use. As in the case of the other national parks, these game animals, protected by law from interference, will increase to such an extent as to furnish in the overflow from the park a tempting supply to sportsmen for all time; on the other hand, without such protection of a breeding ground, many of the animals, especially the bighorns and the white goats, will soon become practically extinct.

There are numerous passes through the higher ranges. Across these the game trails lead from valley to valley. Following the game came the Indians; the hunter and the trapper, looking for easy routes of travel, followed the Indians; then came the government engineers exploring and mapping, and finally the hardier of the tourists and lovers of nature. Most of these passes are closed for many months of each year by snow; some of them are available only after the use of the axe to give footing on the hard ice of glaciers lying close to the Continental Divide, but across one or two of them wagon roads may be built by



"HEAVEN'S FOLD"

Distortion of Algonkian strata, as seen from Mount Heavens, Livingston Range. From snow bank at base to summit of peak is over 2,000 feet

which persons unfitted for the strenuous efforts now required to reach the higher country may have opportunity to view it at close range. None of the passes that are south of the Canadian boundary will ever be used for a railway route.

There is interest in Canada which looks with favor upon the creation of the proposed Glacier Park, and at some future day the locomotive may cross from the Dominion to the waters of the Flathead River and wend southward to the towns and farming valleys adjacent to Columbia Falls and Kalispell, forming a link between the Canadian Pacific and the Great Northern railroads. A route on the west side of the Flathead River, says Mr Chapman, is very available for the location of a railroad track.

In order to open this region of superb and unique scenery for the public, a few main roadways will be required along the streams, together with horse trails to points of especial interest. Lake McDonald, it is pointed out in the Senate report, lying near the southwestern boundary of the proposed park, is a sheet of water of unmatched beauty, surrounded by scenery of such signal grandeur as to make a roadway along its eastern shore extremely desirable, but this, it is stated, is a matter for the future consideration of Congress.

AN IDEAL NATIONAL PLAYGROUND

The region combines all the elements of an ideal "playground" as it stands. It needs only official designation to insure its protection and perpetuity as such to stimulate the establishment of transportation facilities, making it more readily available to visitors. While of interest geologically, it is of little, if any, economic importance. The conditions are particularly adapted to the study of the structure and history of mountain building, as the ancient forces of nature were most active and a tremendous folding and warping of the once horizontally bedded rocks is in many places apparent. At one time prospectors for copper flocked to the region, but no finds were made indicative of any economic deposits, and the same may be said as to oil. From the reconnaissance made by the Geological Survey it is not believed that Glacier Park contains any mineral-bearing formations of commercial importance. However, if such are discovered following the creation of the park there will be nothing to hinder their development.

THE MOST CURIOUS CRAFT AFLOAT

The Compass in Navigation and the Work of the Non-Magnetic Yacht "Carnegie"

By L. A. Bauer

Director of Department of Research in Terrestrial Magnetism, Carnegie Institution of Washington

Illustrations from Photos by Magnetic Expeditions of the Carnegie Institution

A RECENT newspaper clipping brings the following interesting information:

"Mr Carnegie's non-magnetic yacht, the *Carnegie*, which is making sea surveys for the Carnegie Institute, has made the discovery that American charts show errors of three degrees between Madeira and Bermuda. 'These errors,' it is stated, 'could not have been discovered in other than a non-magnetic vessel.' That being the case, what was the good

of discovering them? There is only one non-magnetic vessel afloat, and that is the *Carnegie*, and the 'magnetic' vessels seem to have got along very well in spite of the errors."

This clipping is interesting from various points of view and serves splendidly as a text for what we have to say. The pardonable misapprehension of the reporter as to the purpose of mapping out the earth's magnetic forces, as accurately as possible, gives point to the following quotation from Thomas Hood's amusing essay on "The Ocean":

"The importance of the mariner's compass to the sailor is as well known universally as the utility of the little one-eyed instrument, for which Whitechapel is so famous, to the tailor: but its mode of action and the manner of application must be far less generally understood."

Hood draws the comparison here between the tailor's one-eyed instrument and the compass needle which, because of its antics and "variations," gave the sailors "stitches." And he says:

"The needles have sometimes been fatal to mariners."

At the time of the launching of the *Carnegie*, on June 12, 1909, accounts and explanations of the unique features of this, the most "unattractive" craft afloat, as one paper put it, appeared in newspapers and periodicals, not only in all parts of our own country, but in all civilized regions of the globe. Since then clippings are received almost daily with respect to the work done by the vessel. In view of this wide-spread interest, I have accepted with much pleasure the invitation of the editor of the NATIONAL GEOGRAPHIC MAGAZINE to describe, in untechnical language, the *Carnegie's* work, and to set forth the purposes of her mission.

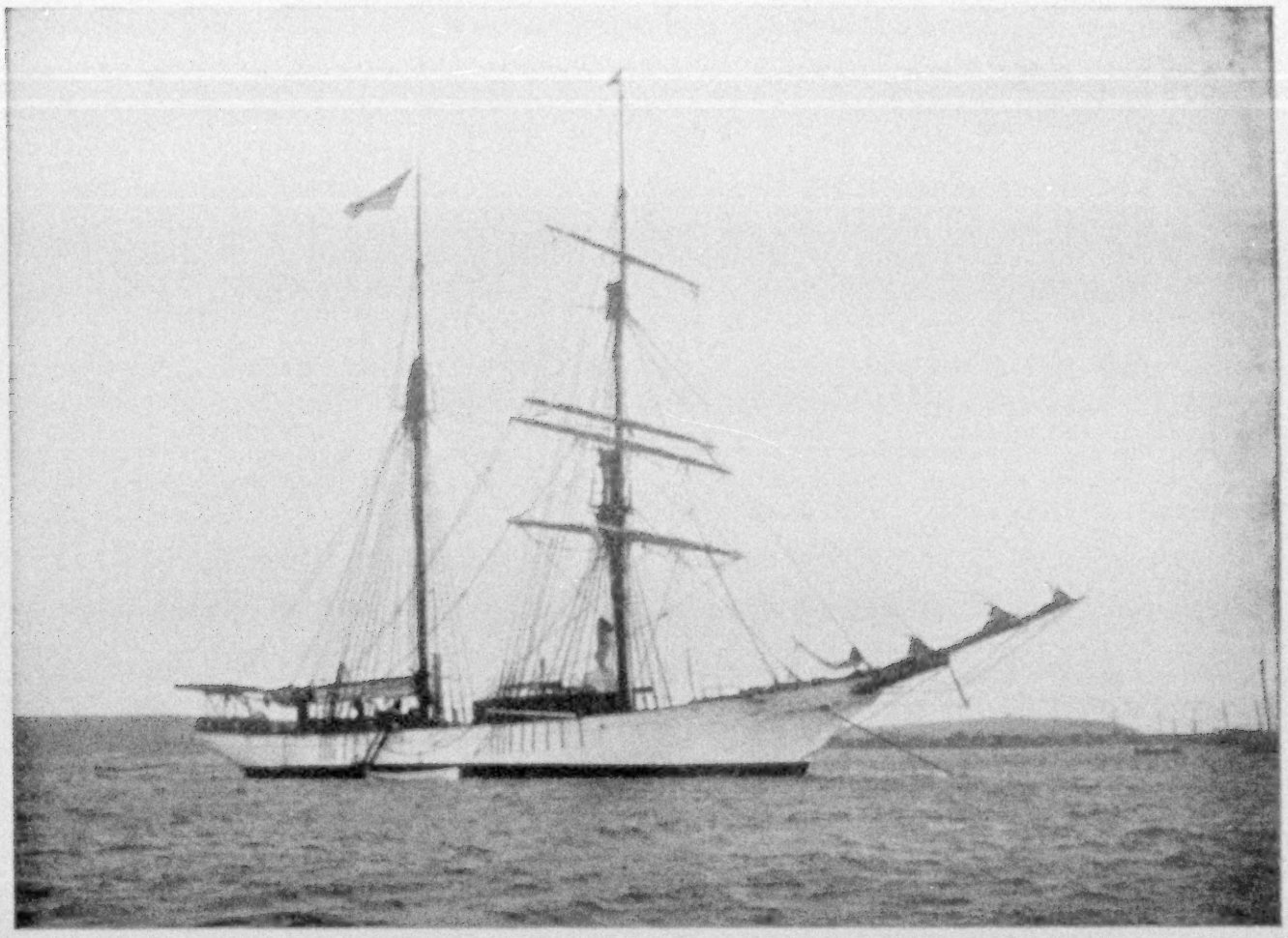
Let me say first that the name of the institution under which the *Carnegie* is operating is the "Carnegie Institution of Washington," not the "Carnegie Institute," as the reporter has it. The latter is located in Pittsburg, and is an entirely different organization.

HOW DO WE TELL THE NORTH?

From early childhood we are taught that, if we face the north, then our right hand is pointing eastward. But suppose we were suddenly transplanted to a region utterly unknown to us, and where a dense cloud covered the sun by day and the stars and moon by night. How could we tell then which direction was northward? This is precisely the problem the mariner has set before him on the trackless seas when the skies are overcast with heavy clouds, completely shutting out all view of celestial bodies.

Fortunately there is one natural agency — independent of wind and weather, night or day—which comes to our rescue, and upon which the navigator, in spite of its so-called "fickleness," has come to rely, namely, the earth's magnetism, by whose subtle power a definite direction is imparted to a delicately poised magnetized bit of steel. Take a compass needle, such as can readily be purchased for a mere trifle and is often found inserted in watch charms; hold it on the table, where it will not be exposed to jarring. When the needle has come to rest, note its direction, then draw it aside by bringing sufficiently close to it a pocket knife or any other article of iron or steel; next, quickly remove the article. The needle swings back and forth, first through a large arc and then through a gradually diminishing one, until finally it comes to rest; if the proper precautions have been taken this position will be found identical with the first. Repeat the experiment and once more, after various oscillations back and forth, the needle settles down to the same direction as before. Why is this?

Sir Isaac Newton, from seeing the apple drop, concluded that the cause of this "phenomenon" was to be referred to the "force of gravitation": the earth "attracted" to itself the apple. And were we to suspend a heavy mass, from the ceiling, let us say, it will hang in an invariable direction—the vertical, or that shown by the plumb-line. Draw the mass aside, then release it. It swings



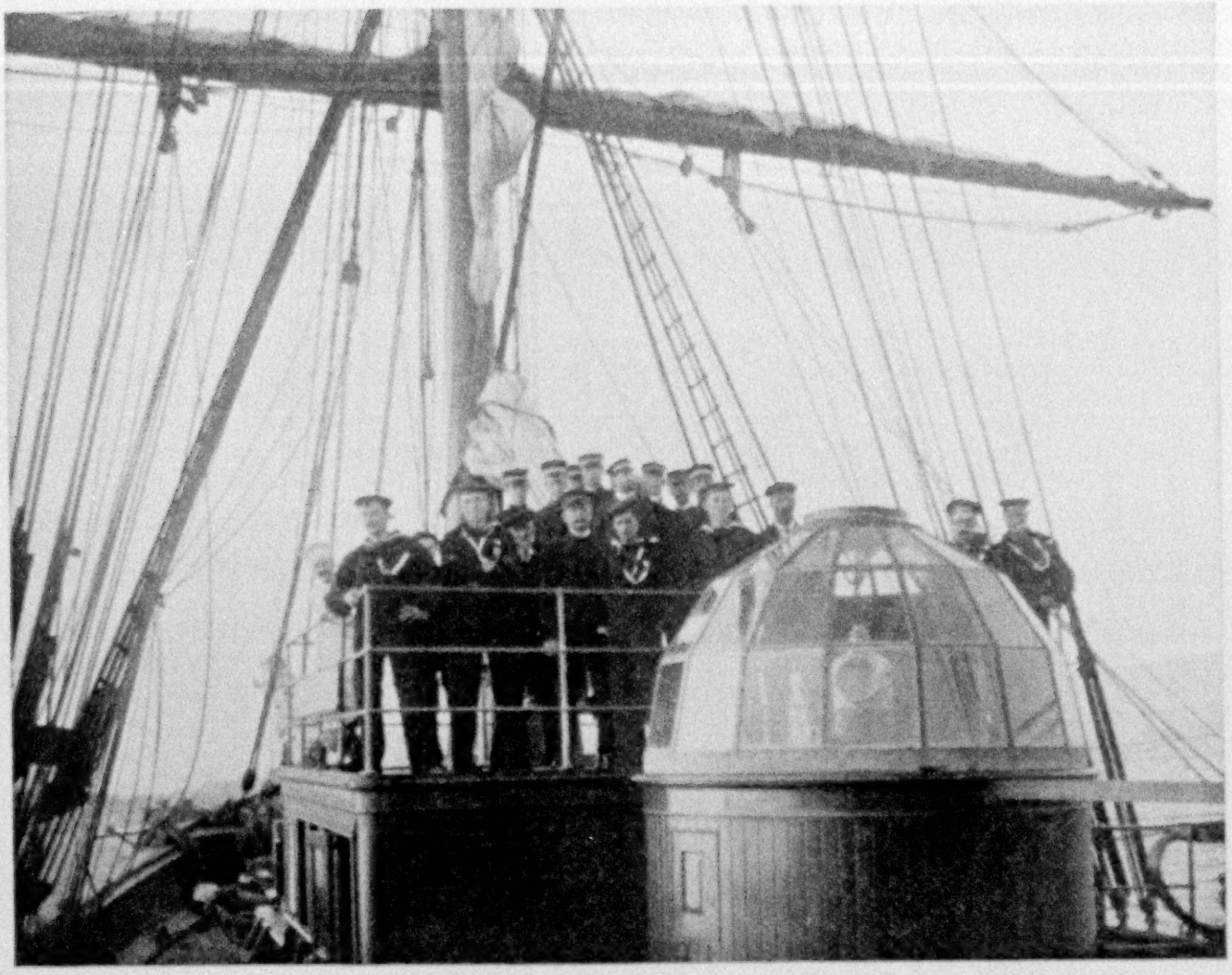
VIEW OF THE NON-MAGNETIC YACHT "CARNEGIE" AT FALMOUTH, ENGLAND

back and forth just as did the magnetic needle, and, when it comes to rest, it again hangs vertical. The force which was in operation during this experiment was precisely the same as that acting on the falling apple. Is this also the force which acted on the swinging compass needle? No, because the latter was moving to and fro in a horizontal plane, and gravity only acts in a vertical direction.

THE MAGNETIC DIP NEEDLE

Suppose we were to take now a "dip needle," such as was used for the first time by an ingenious and painstaking English instrument maker, Robert Norman, in 1576. This needle is so mounted that, instead of being able to swing in a level plane, it swings in a vertical one. Norman discovered that no matter how carefully he had balanced the needle before it was magnetized, after touching it with the lodestone, so as to magnetize the needle, then there was no longer a perfect balance, but "that presently the north point thereof would bend or decline downwards under the horizon in some quantity." He at first thought that, in spite of his care, he had overweighted the end that dipped below; however, upon repetition of the experiment, he invariably found the same result, and thus was discovered the so-called "dip of the magnetic needle." If the two ends of the magnetized needle are precisely equal in weight, and still the needle won't remain level after magnetizing, then evidently we must have some other force acting than gravity. And the mystery increases, for, if we use a brass needle instead of a steel one, no matter how much we stroke it with the "magnetizing irons," it persists in remaining level.

Evidently we are dealing with a force different from that acting on a falling body. While gravity affects all substances alike, magnetism affects but a



THE SCIENTIFIC STAFF AND CREW OF THE "CARNEGIE" ON THE CRUISE FROM SAINT JOHNS, N. F., TO FALMOUTH, ENGLAND, OCTOBER, 1909

In the foreground is seen one of the two special observation houses in which the instruments are placed. The dome can be revolved and an open panel pointed to any part of the skies, thus making possible both astronomical and magnetic observations, and affording protection from wind and weather.

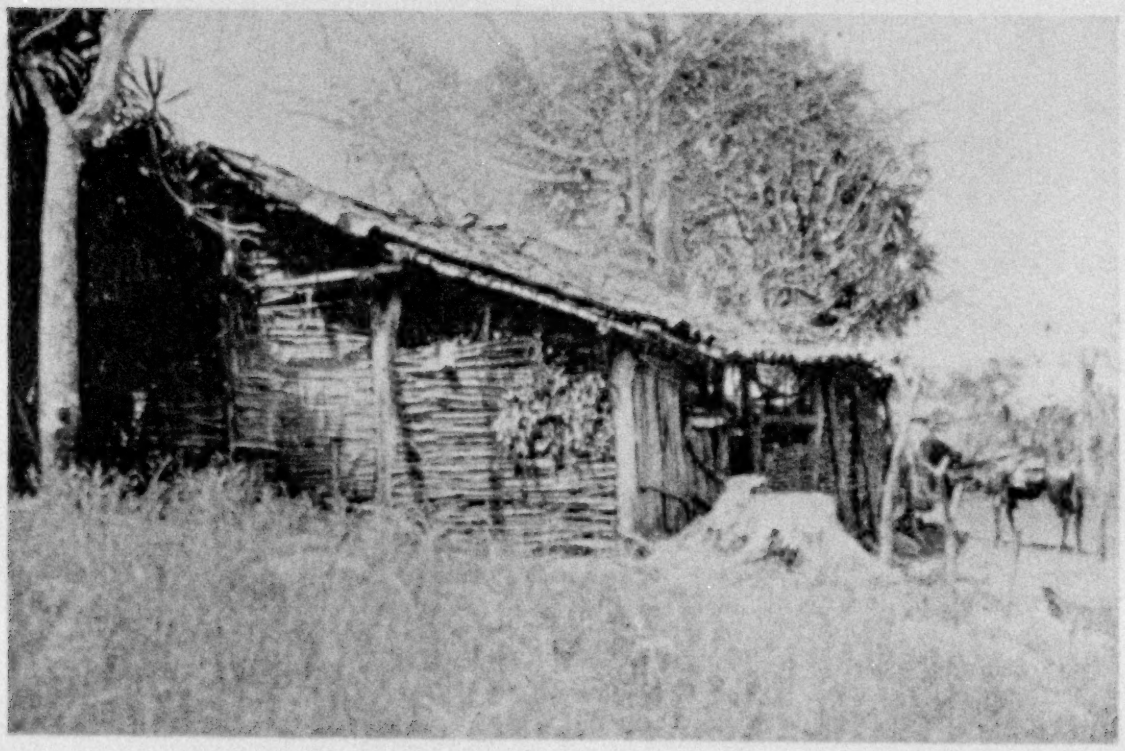
very few, chiefly iron, steel, nickel, and cobalt. The last two substances respond so feebly to a magnetic force that compasses made of them would be almost as useless as those made of brass. In one other respect magnetic force differs in its action from that of gravity: the force exerted on a magnet is not the same on the two ends—equal in strength and likewise parallel, to be sure, but *opposite* in direction.

If, therefore, as has long ago been concluded, it is the earth itself, as a magnet, which is exerting the force we saw acting on the compass and on the dip needle, then its action is that of a couple. That is to say, were we to float, as Robert Norman did, over three centuries ago, a magnetized needle on a cork in a bowl of water, then, if the liquid is not agitated, the cork will not move from place to place, but simply turn around until the needle points in the direction it occupied at the end of the experiment of vibrations made above.

VAGARIES OF THE COMPASS

If the compass invariably points out some definite direction, where does it point? To the exact north—to the North Star or to the true North Pole? "True as the needle to the pole," the old saying has it, but, alas, considerably far from the truth. In northeastern Maine the compass stands 20 degrees west of north; in the northwestern part of the

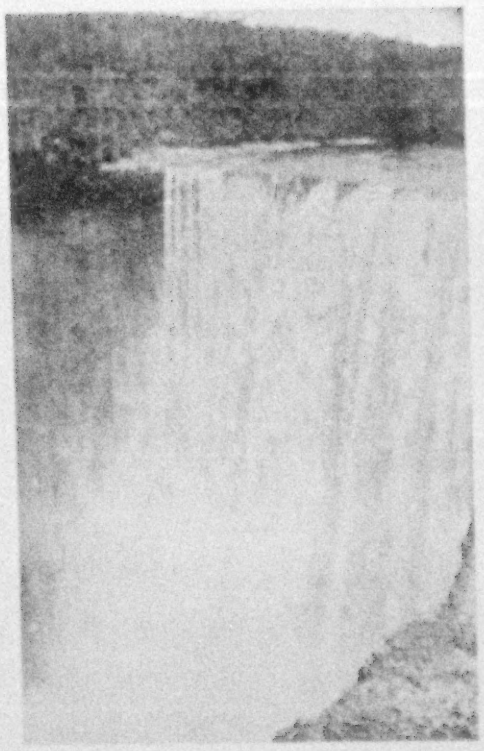
BREAD OVEN: GUATEMALA



MOUNTAINEER'S HOME: GUATEMALA

State of Washington 24 degrees east of north; in western Ohio and South Carolina it points either exactly north or nearly so. Taking a trans-Atlantic liner at New York bound for England, the compass continually varies its direction along the entire route traveled, starting out with about 10 degrees west at New York and increasing in the mid-Atlantic to about 30 degrees west, and then dropping to about 17 degrees west at Southampton.

Suppose the earth were an iron ball and it were magnetized symmetrically about the rotation axis, then the magnetic poles would be precisely where

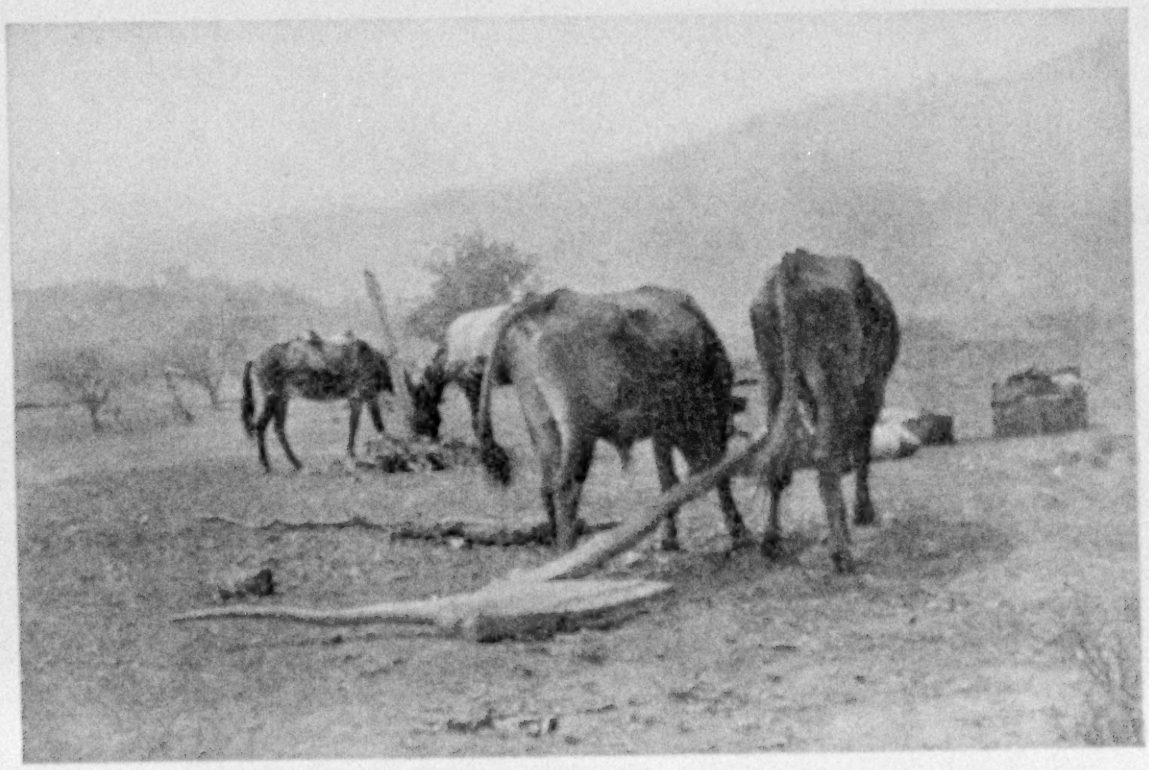


KAIETEUR FALLS, BRITISH GUIANA (741 FEET HIGH)

the true poles are. In this case the needle would everywhere point exactly north and south; or, as the mariner would say, "there is no variation of the compass." The problem of navigation would then be extremely easy: if you wished to go due east, for example, all you would have to do is to set your course east by the compass, and once set it would remain set for the whole cruise.

Assume, now, that the magnetic poles are no longer coincident with the true poles, but are displaced by equal amounts. This case represents an earth uniformly magnetized about a diameter making some angle with the axis of rotation. The magnetic poles are still truly opposite to each other, but, needless to say, a more complicated condition of affairs for navigation is presented. We must now deal with a "variation of the compass," for no longer does the compass point truly north and south. If the mariner knew the location of either magnetic pole, he could readily figure out, for an earth thus simply magnetized, how the compass actually pointed at any place for which the latitude and the longitude were known.

Ralph Walker, of Jamaica, published a book in 1794 in which elaborate tables of the compass direction were given. He believed that the "poles of the ecliptic are the magnetic poles." After exalting the Supreme Architect for having given us this great gift of the earth's magnetism, by which "He enables us to behold



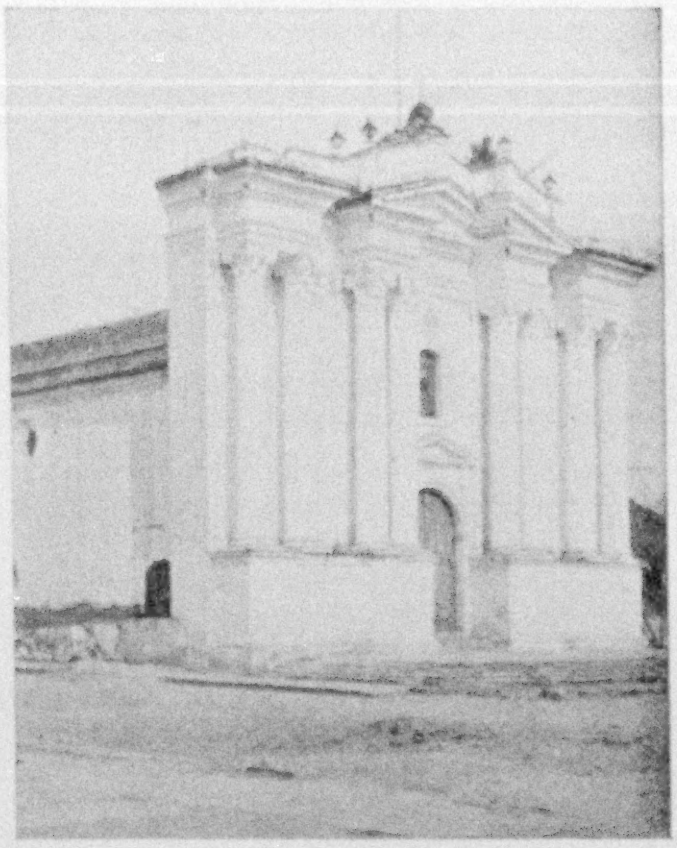
WOODEN PLOW USED IN THE INTERIOR OF GUATEMALA

His works and our fellow-creatures in all the different corners of the world," etc., he goes on to say:

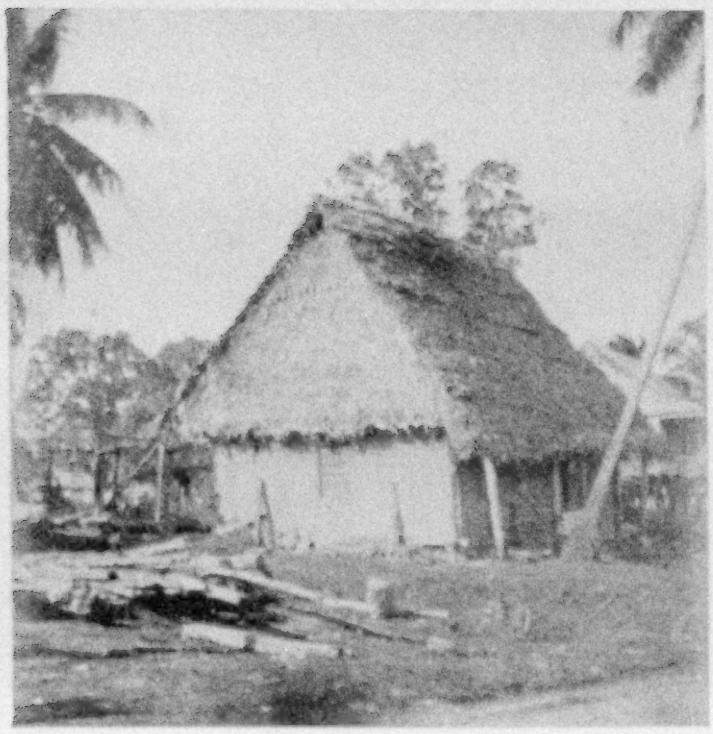
"I hope that I shall be excused for this short digression, it being only the result of my feeling, when I conceived that the longitude might be found by magnetism (with the improvements which I have made upon it) without any trouble or calculation, and with as much certainty at sea as any other way now in use." Alas for Ralph Walker's fond hopes! In spite of his "improvements" upon the Supreme Architect's magnetism, we have not yet been able to find the longitude at sea so simply as he hoped, nor have we been able to make use of his elaborate "Tables of Variation."

THE EARTH'S MAGNETIC POLES

The earth, far from being magnetized in the simple manner above supposed, is instead most irregularly magnetized, the distribution of land and water evidently playing an important rôle. In place of the magnetic poles being on opposite sides of the earth, the North Magnetic Pole is in about latitude 70° north and longitude 97° west, and the South Magnetic Pole is approximately in latitude 73° south and 156° east. Draw a straight line connecting the two poles and it will pass through the earth 750 miles off from the center. No formula has as yet been found which, even if we knew the exact positions of the two magnetic poles, could give the direction of the compass at any point of the earth sufficiently close to satisfy the demands of the navigator and the surveyor.

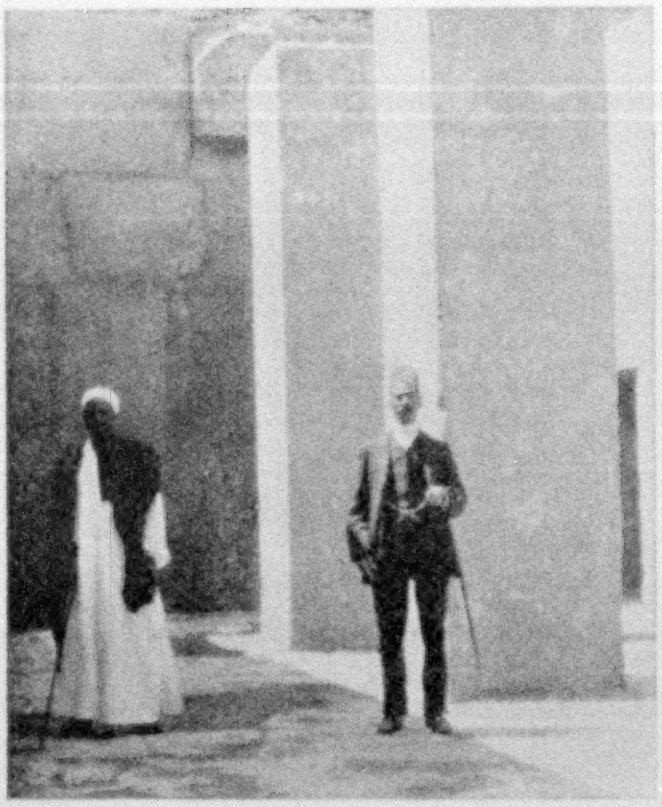


CATHEDRAL ENTRANCE: HUEHUETENANGO, GUATEMALA



NATIVE HOUSE: PUNTA GORDA, BRITISH HONDURAS

Hence, instead of mathematical tables, charts must be supplied to the mariner showing him, wherever he is likely to go, just how the compass points. But, to construct these charts, some one must have found previously, by actual observation, the relation or angle between the true north and the magnetic or compass north. The mariner knows these charts by the name of "Variation Charts," and the lines drawn on them as, "Lines of Equal Variation," which connect all places where the "variation" or compass direction is the same, just as the isothermal lines on a weather map join the places of the same temperature. The



GRANITE COLUMNS, TEMPLE OF THE SPHINX, GHIZEH, EGYPT

more scientific term is "Lines of Equal Magnetic Declination."

The first one to construct such a chart was the noted Astronomer Royal of England, Edmund Halley, who, at the expense of the English government, sailed over the Atlantic Ocean on the ship *Paramour Pink* between 1698 and 1700, and in 1701 published the first "Lines of Equal Magnetic Variation," chiefly, of course, for the Atlantic Ocean. Since then various expeditions have been sent out and new charts have been issued. Of such expeditions, the most recent and extensive was that of the *Challenger*, 1872–1876, again supported by the English government. In fact, to that government and to its various scientific bodies must be given the credit of having contributed most hitherto, of any nation, to the advancement of our knowledge of the earth's magnetism. One of its most noted scientific men, Prof. J. A. Fleming, thus concludes his excellent address* on "The Earth, a Great Magnet," delivered to the workingmen of Liverpool, September 10, 1896, at the time of the meeting of the British Association for the Advancement of Science:

"That great empire which has its center in these islands, but its dominions scattered over distant seas, has been built up primarily on the art of navigation, in which the magnetism of the earth is a central fact. Neither its world-wide commerce, nor the naval power which defends its coasts, could exist for a day without the aid of the magnetic compass."

* Published in the Journal "Terrestrial Magnetism and Atmospheric Electricity," vol. II, 1897.

THE MAGNETIC SURVEY OF THE EARTH

But, if so much splendid work has already been done, why is it necessary for the Carnegie Institution of Washington to do so much? From 1905 to 1908 it had the brigantine, the *Galilee*, on the Pacific Ocean, the aggregate length of whose cruises amounted to 60,000 miles. Now it has a specially constructed vessel engaged in magnetic work on the Atlantic. Its magnetic observers have already penetrated to nearly every part of the earth—Greenland, Baffin Land, Labrador, Newfoundland, British North America, Mexico, Central America, Panama, Colombia, Ecuador, the Guianas and

FOUNTAIN IN THE ALABASTER MOSQUE OF MOHAMMED ALI, CAIRO, EGYPT

DESERT SCENERY: HELWAN, EGYPT

Venezuela, West Indies, Bermuda, Africa, Turkey, Asia Minor, Persia, Asiatic Russia, China, and the South Pacific Islands. It is, furthermore, coöperating with various polar expeditions, and is thus securing magnetic data in those far-off regions. In another five years it is confidently expected that the Carnegie Institution of Washington will be able to issue new sets of magnetic charts for nearly the whole earth, as based for the first time upon uniformly and systematically acquired data.

Why was all this work needed, and why is it that this country has now taken the lead and has the good-will and the effective coöperation of every civilized country in the prosecution and completion of a project covering the entire globe—"the magnetic survey of the earth"?

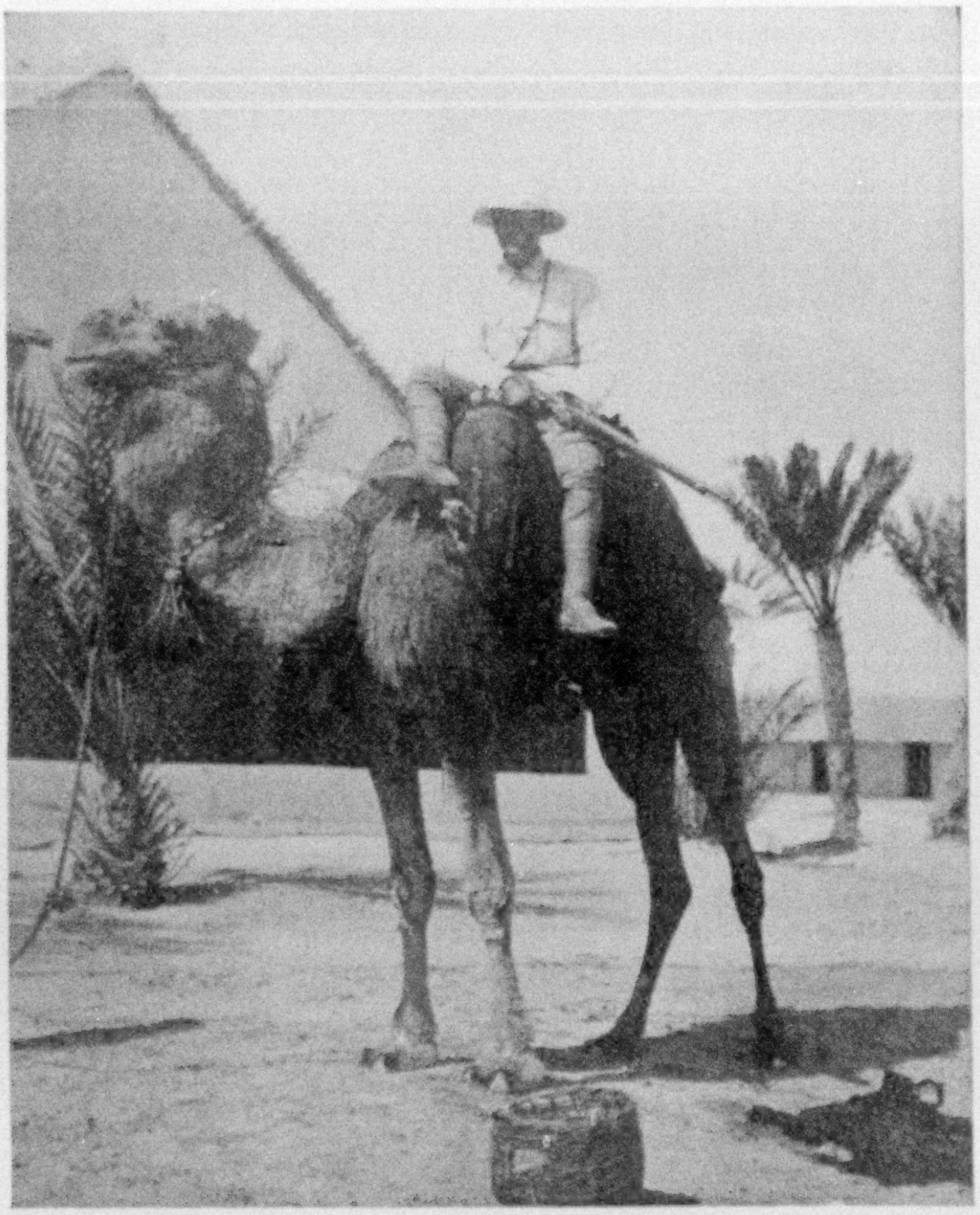
"THE MAGNETIC STATE OF OUR GLOBE IS ONE OF SWIFT AND CEASELESS CHANGE"

In the year 1634 Henry Gellibrand, professor of mathematics at Gresham College, found, upon careful observation, that the compass pointed, at London, 4 degrees 6 minutes east of north. His predecessor had observed, in 1622, not quite 6 degrees, and Borough and Norman, in 1580, had noted 11¼ degrees east. Hence between 1580 and 1634 the easterly direction of the compass had changed by 7 degrees. Before Gellibrand's time it had become generally known that the compass changed its direction from place to place over the earth, but it was supposed "fixed and invariable at any one place"; but now an entirely new fact became known.

Since Gellibrand's time the fact that the compass changes its direction with time has become definitely known, and has painfully impressed itself upon every surveyor who has attempted to relocate land bounds by the bearings recorded in the original deeds of conveyance. He must make due allowance for the changes, and that is just where the trouble comes in—the amount of change to allow since the original survey. For the same reason navigators' compass charts are soon put out of date and so require to be corrected.

Sir John Herschel aptly said:

"The configuration of our globe—the distribution of temperature in its interior—the tides and currents of the ocean—the general course of the winds and the affections of climate—whatever slow changes may be induced in them by those revolutions which geology traces—yet remain for thousands of years appreciably constant. * * * But the magnetic state of our globe is one of swift and ceaseless change. A few years suffice to



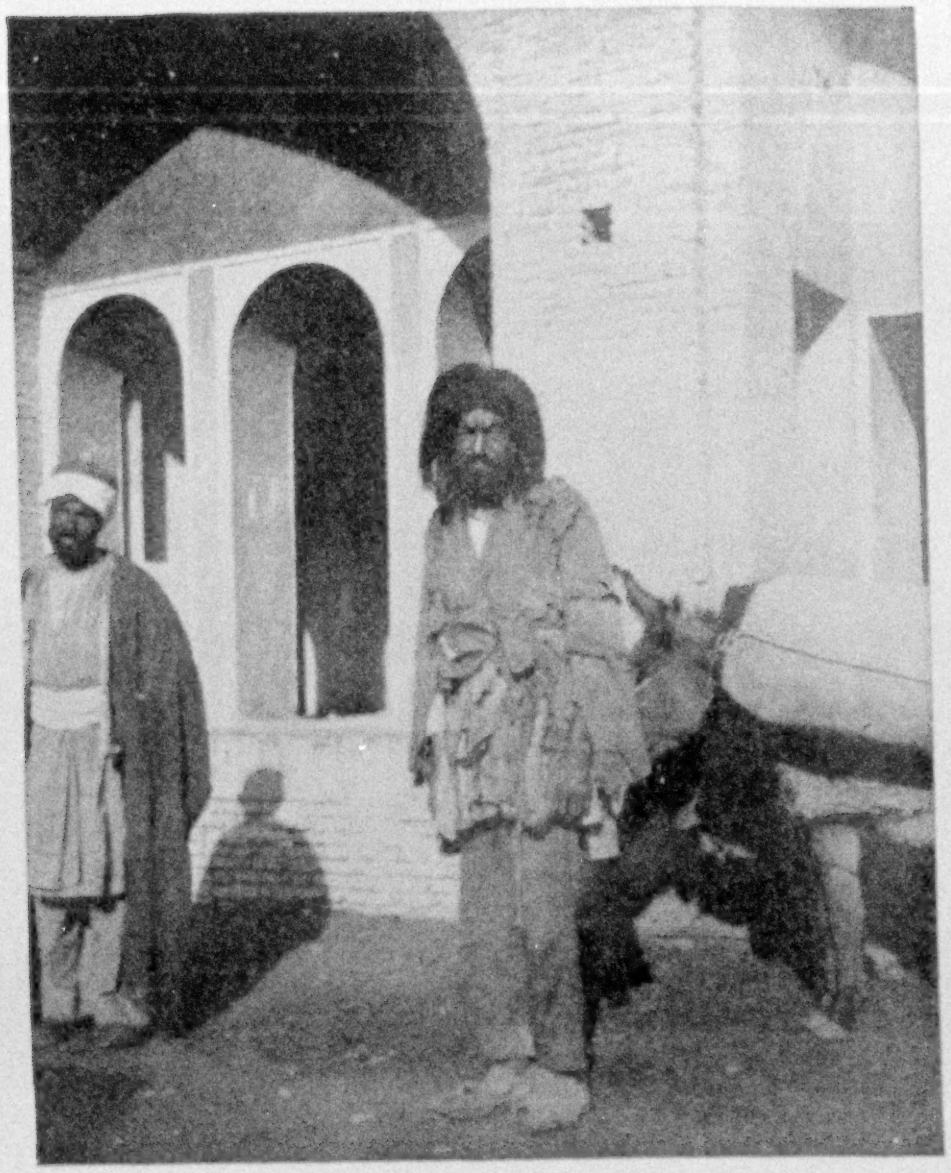
TRAVELING IN PERSIA ON CAMEL

alter materially, and the lapse of half a century or a century to obliterate and completely remodel the form and situation of those lines on its surface which geometers have supposed to be drawn in order to give a general and graphical view of the direction and intensity of the magnetic forces at any given epoch."

We thus see the need of repetitions of magnetic surveys.

MAGNETIC STORMS OCCASIONALLY PARALYZE THE TELEGRAPH WIRES AND PREVENT THE TRANSMISSION OF TELEGRAMS

By this time the reader will doubtless have received the impression that the earth's magnetism, at best, is certainly a most unsatisfactory source of guidance, and so it undeniably is. But matters are still worse than already shown. The magnetic needle is subject to all sorts of fluctuations in addition to the one already described. Fortunately most of them are of too short duration or of too small an amount to require attention for the practical purposes of navigation. However, in time of a severe magnetic storm, as occurred on September 25, 1909, the compass may change its direction 5 degrees and more in a quarter of an hour, even at a place so far distant from the North Magnetic Pole as is the city of Washington. But



BEGGAR AT MAHUN, PERSIA

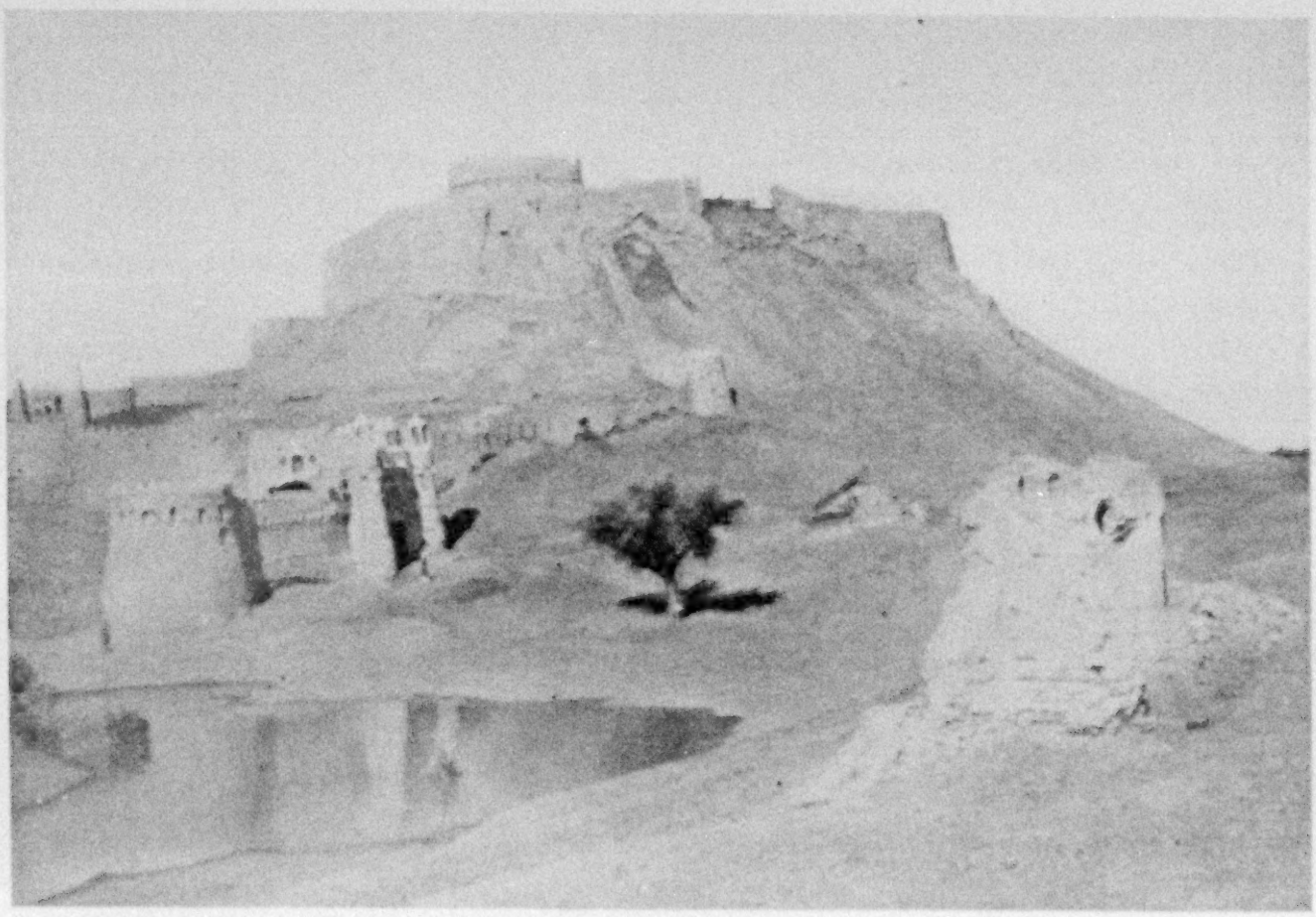
these are more or less temporary derangements, and after a certain time the needle recovers its normal direction. Frequently during the so-called "magnetic storms" there are electric currents generated in the earth of sufficient strength to interfere seriously with telegraphing and cabling.

Were it possible to substitute something else for the magnetic compass it would be a waste of funds, as judged from the "purely practical standpoint," to carry on the extensive magnetic operations of the Carnegie Institution of Washington. However, nothing has been found as yet which "fills the bill" as well as the compass, in spite of its manifest defects.

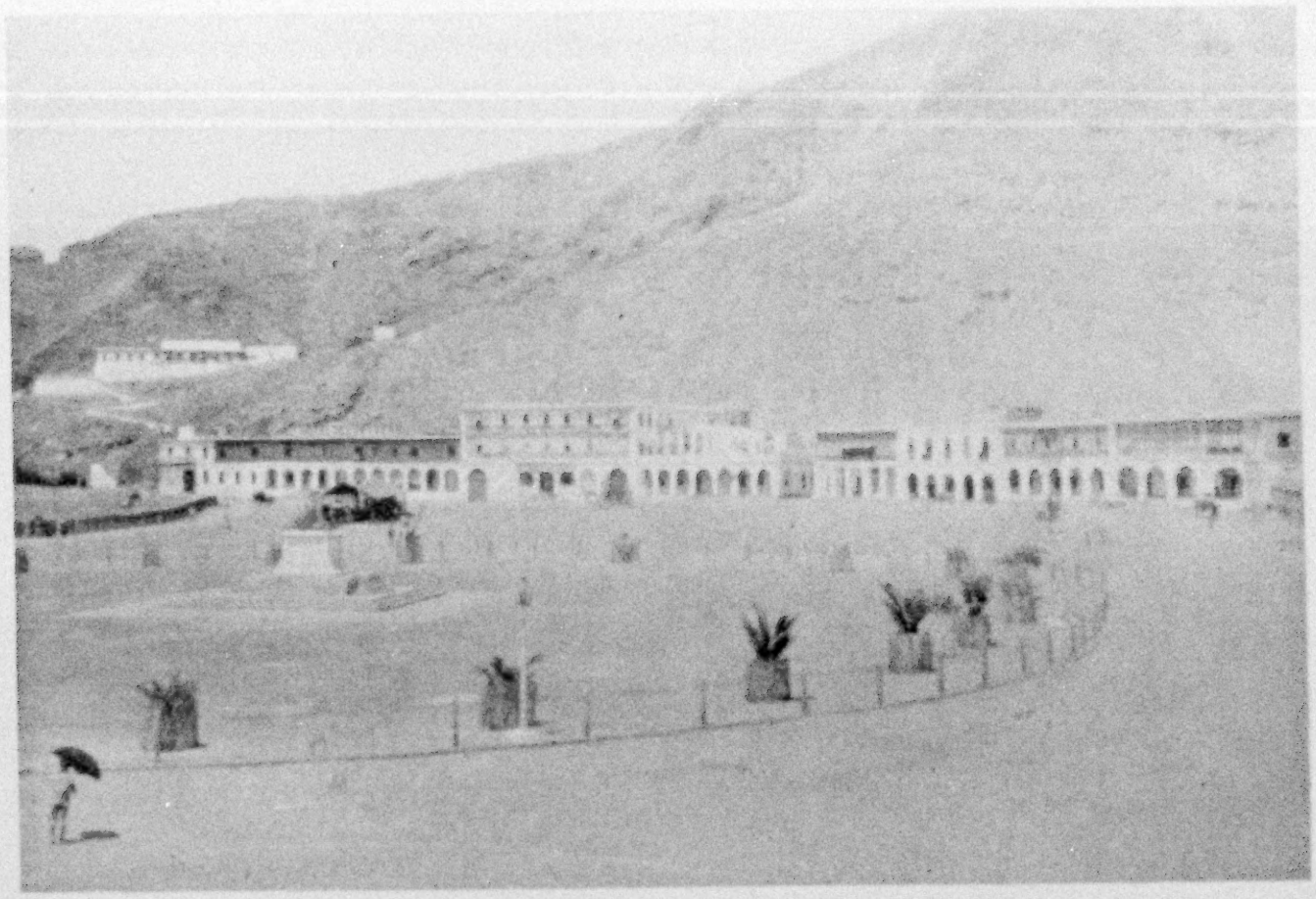
THE "GYROSCOPE COMPASS"

The papers have recently had considerable to say regarding the so-called "gyroscope compass." This instrument is not dependent for the maintenance of its direction upon the earth's magnetism, but is an embodiment of the principle of the spinning top. The spinning is done by an electric motor, a 9-pound wheel rotating about 21,000 times a minute. Just as the axis of the top maintains an invariable direction while the top is in rapid motion, so does the axis of the gyroscope remain unaltered for some time in the direction originally set; this direction may be due north and south, for example. The precise advantage of this instrument is, that it is unaffected by any neighboring iron, and hence this sort of a compass is peculiarly useful on the modern steel vessels and on war-ships. Instead, however, of displacing our old standby, the magnetic compass, it must be regarded chiefly as an adjunct to the

MAGNETIC SURVEY CARAVAN THROUGH COPPER HILLS, PERSIA



FORT AT BAMPUR, PERSIA

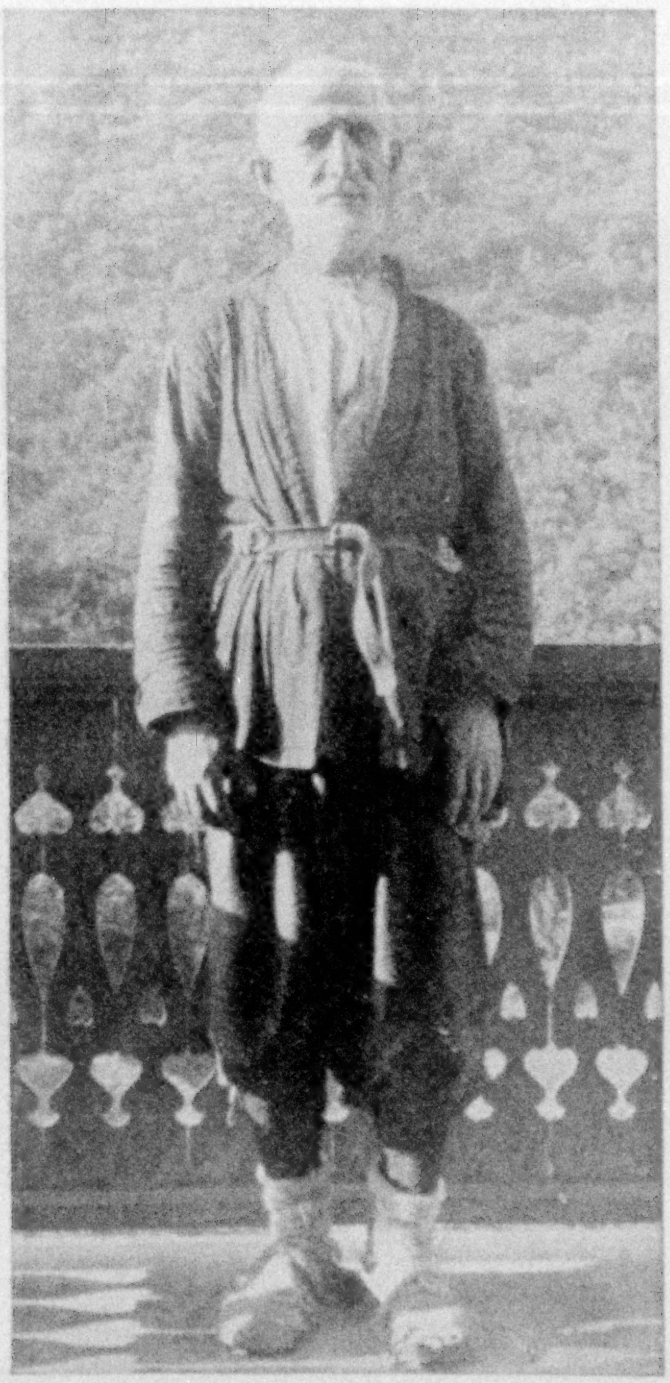


THE "CRESCENT": ADEN, ARABIA

present appliances for controlling and checking a ship's course and her position.

When the solar azimuth attachment was devised, with the aid of which the surveyor was enabled to run true lines instead of magnetic ones, some believed that the compass needle for surveying was doomed. But the sun and stars are not always visible, whereas the earth's magnetism is ever in evidence, and the temptation to resort to the needle could not be resisted. Then again, for running a line through dense forests, or for laying a trial course between two non-intervisible objects, the transit instrument presents difficulties: the line must be cut open, trees must be felled to permit the surveyor to sight ahead and plant his stakes. The compass surveyor, however, may pick his way unaided through the thickly-wooded jungle, and, while his line may not be as true as that of the transit-man, it frequently suffices for the purposes, if traced with some care.

So it is with this recently invented Anschuetz-Kaempfe gyroscope compass now being installed on German war vessels, and said to be used with success by them. Let those use it who can afford to do so, and who, above all, have the time and facilities for studying it and checking its indications thoroughly. It is safe to say that, even on vessels thus equipped, the magnetic compass will not be wholly discarded. In fact, it may turn out that the new instrument will be most serviceable if used as a control or check upon the mariner's compass. For ordinary vessels the expensiveness, cumbersomeness, and frequent necessary control by sun or stellar observations of the new instrument will be prohibitive. It should be stated that if the gyroscope is set whirling with the axis pointed due north at the port of departure, and a due east course is set, for example, the axis will not continue to point due north—this because of the convergency of the meridians. Hence this instrument will also have its errors or deviations, not due this time to the iron in the ship, but simply



A NATIVE TYPE: TRANSCAUCASIA

because the earth is not flat, but round. The ordinary mariner would not find it easy to determine and check up on these errors.

Hence the gyroscope compass, while a most useful and ingenious invention, also has its limitations, and will not at present answer the requirements for continual and universal use. Thus we are again brought face to face with the necessity of making a most careful study of that which the Supreme Architect has given us—the earth's magnetism.

WHY DO THE MAGNETIC POLES MOVE?

I trust the why and wherefore of the magnetic work of the Carnegie Institution of Washington has now been made clear: To make the most complete study possible of the earth's magnetic forces, both as regards their direction and their strength, and, having done this, to determine the changes forever going on, in order that magnetic charts may be kept up to date for the use of the navigator, the surveyor, the explorer, and the man of science.

Thus far only the purely practical and sordid side of a "Magnetic Survey of the Earth" has been presented, but, happily, man will not thus be contented; he wants to know, not simply the "how," but the "why" as well. The many intelligent questions received at the office in Washington and those put to us by persons of all walks of life who visit the *Carnegie*, when in port, must be taken as evidence of genuine interest. I question whether ever before so many people the world over have been led to inquire, What is "terrestrial magnetism," anyway? To be sure, some of the letters are addressed to the "Department of Celestial Magnetism," or to the "Department of Terrestrial Rheumatism," etc. In the main the questions asked are: Where is the Magnetic North Pole? Does it move, or is it fixed? If it moves, is this the reason why the compass changes its direction from year to year? What makes the magnetic poles move? What is the cause of magnetic storms, and what is their connection with auroral lights, electric currents in the earth, and sun spots?

For most of these queries the data are at present either lacking or not sufficient to give definite and complete answers.

THE NON-MAGNETIC YACHT "CARNEGIE"

Now to return to the clipping quoted in our opening paragraph. First of all, let me correct a popular misapprehension: the *Carnegie* is in no wise either owned or controlled by Mr Andrew Carnegie. To him, however, who has acquired his wealth from the successful

manufacture of steel is due the construction of a vessel in which *every effort was made to avoid steel.* The *Carnegie* is owned by the Carnegie Institution of Washington, founded by Mr Carnegie. She was built solely from the funds of the Institution, and has been placed by the trustees directly in the charge of the writer as director and managing owner. The command of the vessel has been intrusted to Mr W. J. Peters.* The vessel is classified as a "yacht" to facilitate port entries as to customs, etc.

CAMEL IN GARI: SHEIKH, ARABIA

PRINCIPAL FACTS REGARDING THE "CARNEGIE"

Dimensions: Length over all, 155½ feet; length on load water-line, 128⅓ feet; beam, molded, 33 feet; mean draft, 12 feet 7 inches; displacement, 568 tons; registered tonnage, 246.

Materials used: White oak, yellow pine, Oregon pine, teak.

Fastenings: Locust treenails, copper and Tobin bronze bolts, composition spikes.

Anchors: Four of manganese bronze; total weight, 5,500 pounds.

Anchor chains: None; instead, three 11-inch hemp cables, each 120 fathoms.

Sail power: Brigantine rig, 12,900 square feet of plain sail; rigging, special Russian hemp; all metal-work on spars, rigging, and blocks of bronze and gun-metal.

Auxiliary power: 150 indicated horse-power producer gas engine, built practically of non-magnetic metals, chiefly bronze and copper and non-magnetic manganese steel.

Boats: Two non-magnetic 20-foot whale-boats, one 16-foot gig.

Cooking ranges and refrigerating plant: Bronze and copper.

Cutlery: Mexican silver.

Personnel: Scientific staff — 7 men; crew, 14; 21 in all.

Naval architect: H. J. Gielow, of New York; builder, Tebo Yacht Basin Co., Brooklyn, under the management of Wallace Downey.

First vessel built non-magnetic.

First sea-going vessel equipped with a producer gas engine. In calm weather, a day's run can be made, with auxiliary power alone, of 144 nautical miles, at total cost for coal consumed of $7.

Her object: Sun and stars serve to shape a ship's course only when visible; the earth, however, by its magnetic power, directs the mariner's compass unfailingly, be it night or day, cloudy or foggy. To reap the fullest benefit possible from this natural agency the *Carnegie* is mapping out the magnetic forces as they prevail over the oceans, for the good of all countries. Her mission is hence international.

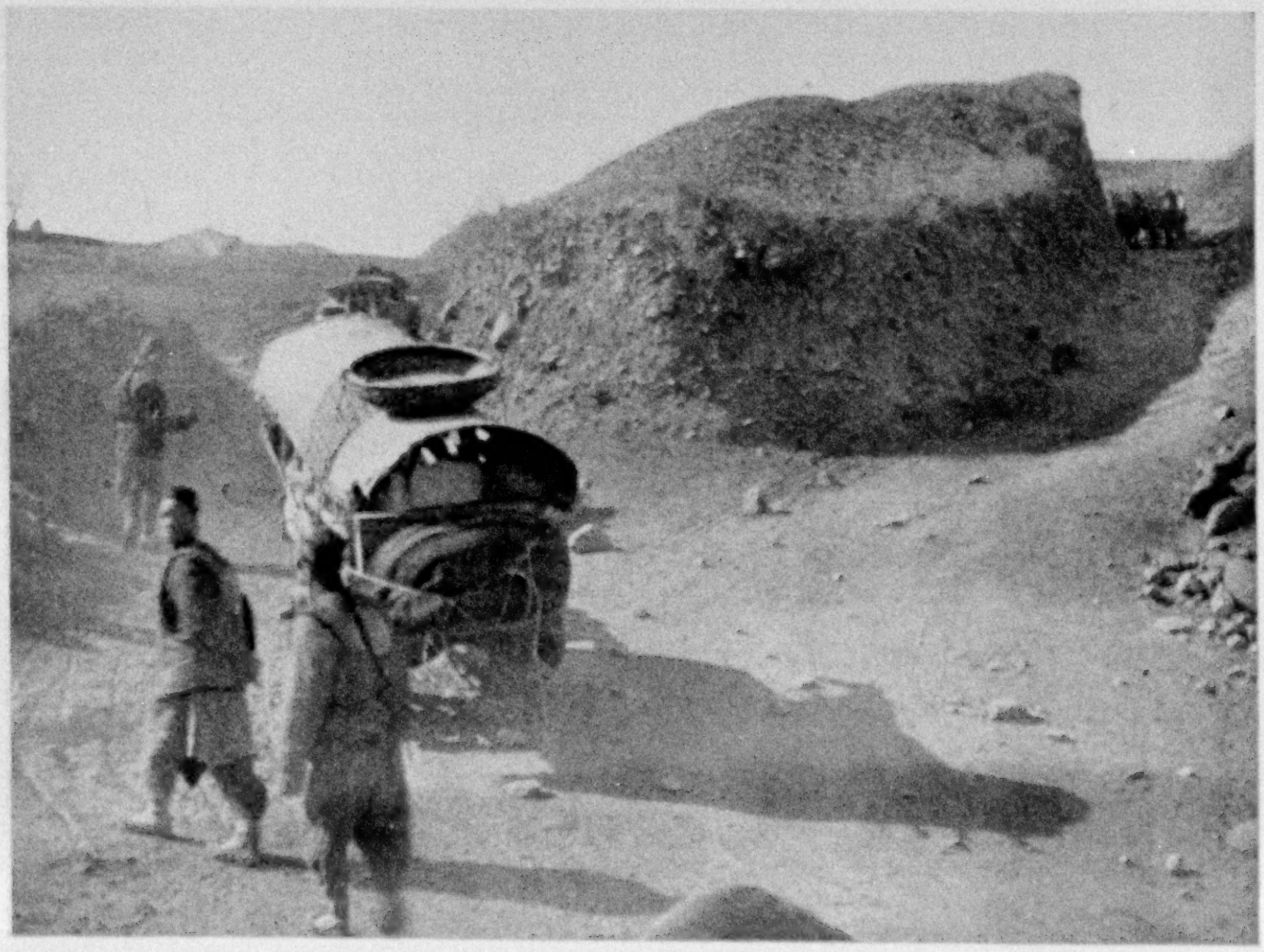
Thomas Hood, in his amusing poem, "The Compass with Variations," must have anticipated the building of a *Carnegie:*

> "They found no gun—no iron none
> To vary its direction."

Newspaper reporters have accused us of being so fastidious that the applica-

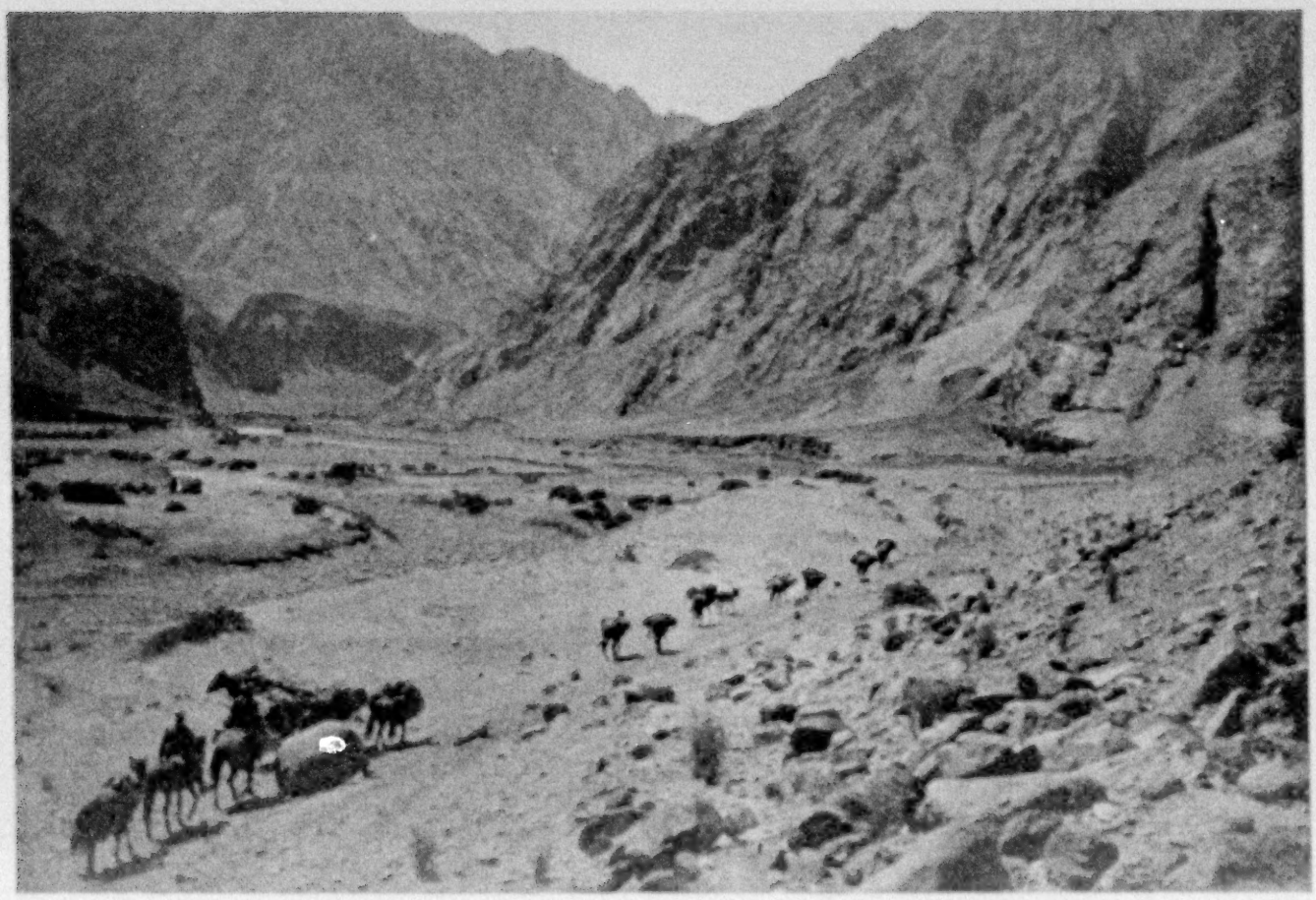
*Mr Peters was the representative of the National Geographic Society on the Second Ziegler Polar Expedition, being second in command and in charge of the scientific work. Upon his return he accepted the command in 1906 of the *Galilee*, then engaged in magnetic work in the Pacific Ocean for the Carnegie Institution of Washington.

BOSTAN, AT THE FOOT OF THE HIMALAYAS



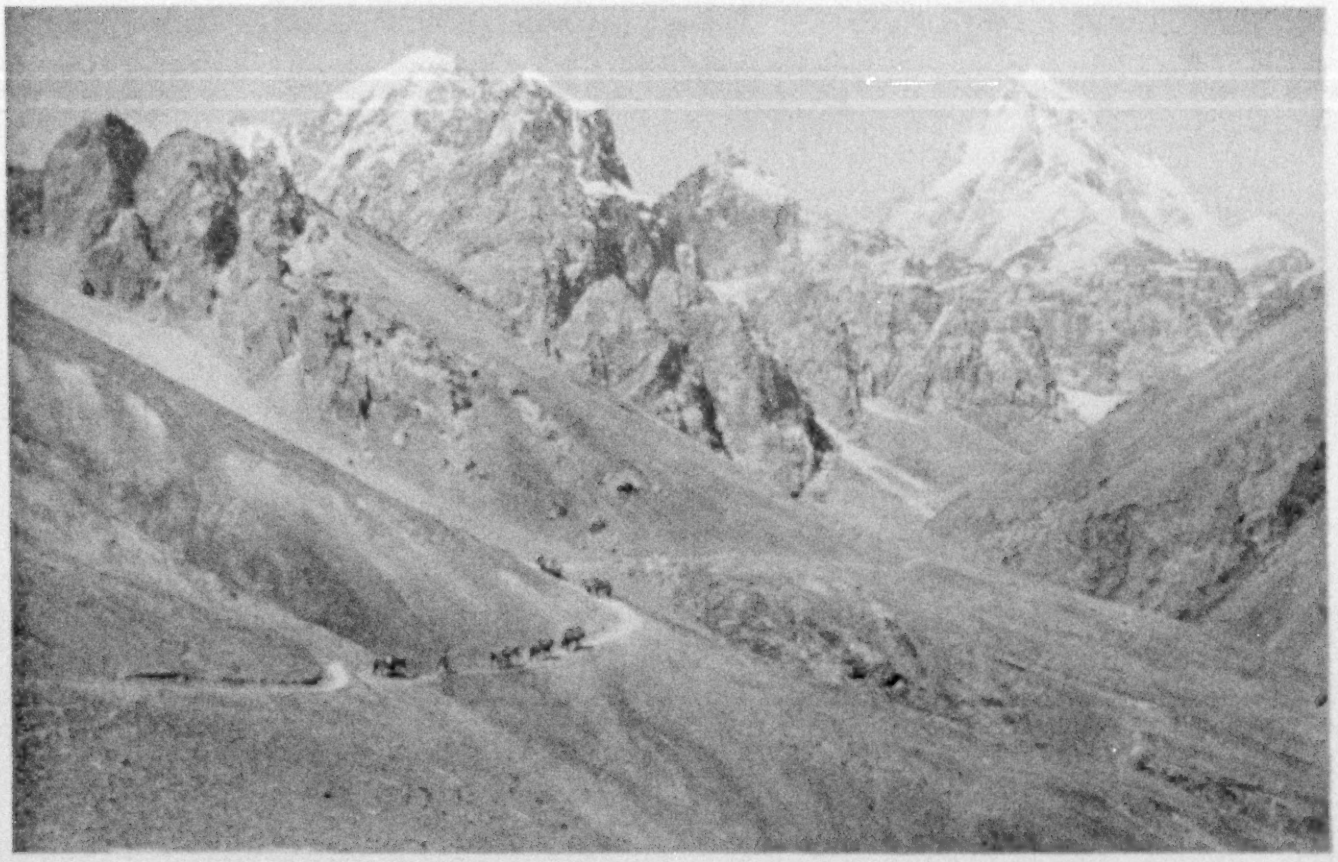
MAGNETIC SURVEY PARTY STARTING FROM HONANPU, CHINA

SAND DUNES NEAR KHOTAN CHINESE TURKESTAN



CARAVAN OF MAGNETIC EXPEDITION ALONG KARAKASH RIVER

XUM



THE CARAVAN AMONG THE HIMALAYAS, SEPTEMBER, 1909

THE LEADER OF THE MAGNETIC EXPEDITION CROSSING HIMALAYA MOUNTAINS

tion of a competent sailing master was "turned down" solely because of his "iron" constitution, and that we allowed only "bronzed" sailors on board the *Carnegie!*

But, why was it necessary to build a vessel practically without iron, and just what is the advantage in discovering chart errors with her?

As the reporter correctly says:

"There is only one non-magnetic vessel afloat, and that is the *Carnegie*, and the magnetic vessels seem to have got along very well in spite of errors."

EFFECT OF SHIP'S IRON ON THE COMPASS

The iron on board a vessel affects the compass needle generally in the following two ways: First, it disturbs and alters the normal direction of the needle and hence introduces the error known as the "deviation of the compass"; secondly, it weakens the component of the earth's magnetic force acting on the compass. Both effects require to be considered; they are neither of them constant, but vary from place to place. They depend upon the ship's course and change with every alteration in the ship's own magnetism, due to variable cargo and other causes. Even the continuous impact of waves on an iron vessel has an appreciable tendency to "set" or "unset" the lines of magnetic force in the vessel and thus produce a change in the deviation error.

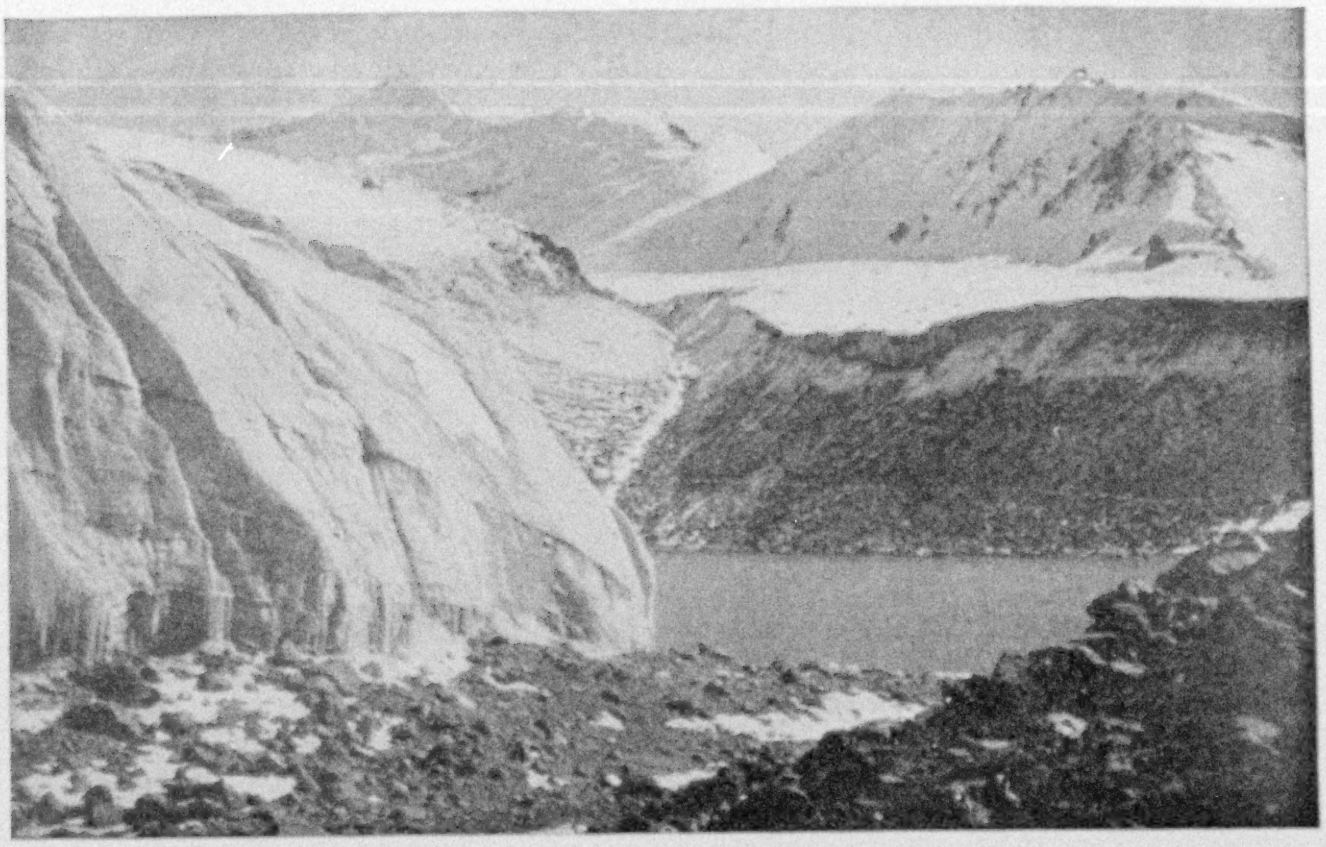
To overcome the baneful effects of an iron vessel on a compass, the latter is "adjusted"—that is, other pieces of iron and magnets are placed in the vicinity of the compass in such a way as to exert an equal and opposite effect to that of the ship's own iron and magnetism. To make this "adjustment" it is necessary to know first how the compass would point were it mounted on a vessel with no iron whatever in her—*i. e.*, on a non-magnetic vessel like the *Carnegie*. Whether a thing is wrong, and, if so, how much it is wrong, cannot be told until one knows what is correct.

To determine the size and strength of the compensating magnets it does not suffice to know merely the correct compass direction at the port of embarkation; the dip of the magnetic needle and the strength of the earth's magnetic force must also be known. Suppose that after various trials the adjuster has succeeded in "correcting" the compass, so that it points just as it would have done in the first place had there been no iron or steel in the ship. Starting off on a trans-Atlantic voyage, we soon find that our compass has not remained "put," but, instead, again shows "deviations" from the magnetic north, due to some of the many possible causes already mentioned.

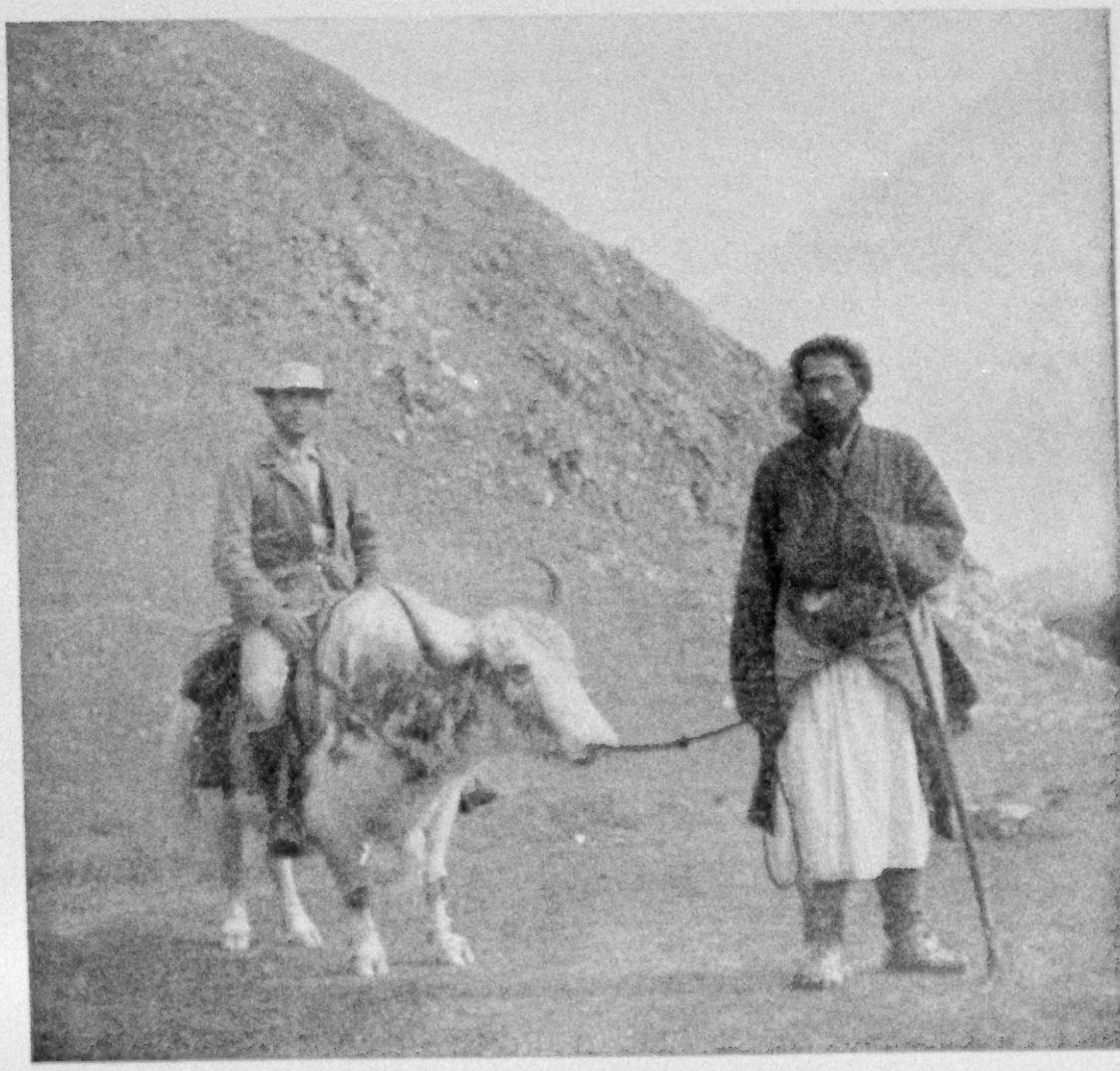
What does the mariner do? Whenever the sun or a star is visible he makes an "observation" and finds how his disturbed compass is pointing. Thus, for example, in latitude 43°.8 north, longitude 58°.9 west, the north end of his compass shows 25° west of north. Turning to his charts, he learns that, according to the British Admiralty Chart, the bearing or "westerly variation of the compass" should be 22°.2; according to the U. S. Hydrographic Office, 23°, and by the German Admiralty Chart, 22°.4. Taking the average of the three best charts now in actual use, he finds that, where his ship is, the compass should stand 22½° west, but he actually found 25° west; hence, assuming the charts to be absolutely correct, he concludes that the deviation error of his compass at that place is 2½° west for a particular heading of ship. And, if he is a cautious captain, he will embrace every chance to "check up" when astronomical observations are possible.

IMPORTANT ERRORS ON CURRENT CHARTS CORRECTED BY THE "CARNEGIE"

But we, on the *Carnegie*, having no effect from iron to contend with, found, on September 22, 1909, that in 43°.8 north and 58°.9 west, the compass actually pointed 23°.7 west. If the mariner had known of this correct value he would have found as the deviation error of his compass 1°.3 west instead of 2½° west. I have taken a favorable case; greater differences between the *actual* and the



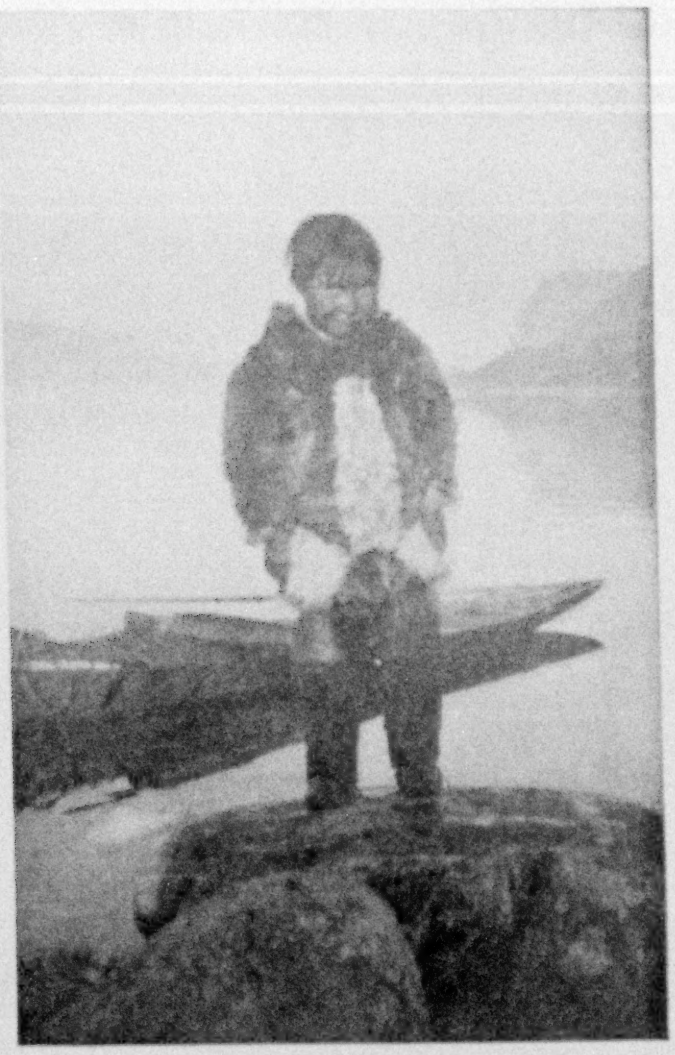
GLACIER, SASER PASS, HIMALAYA MOUNTAINS



A MAGNETIC OBSERVER TRAVELING ON A YAK: SANJU PASS

apparent deviation errors may readily occur. It is thus seen that, before the navigator can determine successfully the outstanding errors of his compass and make proper allowance for them during the interval of night and cloudiness, when celestial objects are obscured, he must know what is the correct "variation" of the compass—*i. e.*, the direction which would prevail had he no source of disturbance beneath him. *The purpose of the work of the Carnegie is to give the mariner correct information.*

With the appliances on board the *Carnegie* there were disclosed, in the short space of six weeks (September 1 to October 14, 1909), systematic errors of importance in the best charts now available. The existence of these errors had been more or less suspected during the past ten years, but, in spite of many thousands of observations on iron vessels by expert and conscientious men, they could not be definitely laid bare. The *Carnegie's* results are accepted as correct by the leading hydrographic offices of the world. Similar systematic errors of con-



ESKIMO GIRL: KANGERDLOOKSOAH, GREENLAND

ESKIMO WOMAN AND BABY: GREENLAND

sequence have been disclosed on the cruise from Madeira to Bermuda and New York. The *Carnegie* returned safely to the latter port on February 10 last, having completed a cruise of 8,000 miles since September 1, 1909. She successfully weathered the many severe storms of the early part of this year. Her next cruise will be a circumnavigation one of the globe.

SHIPWRECKS MAY BE CAUSED BY COMPASS ERRORS

Those in command of vessels, for one reason or another, frequently entrust the compensation of their compasses to some hired adjuster who, after completion of his work and when the vessel has been swung, furnishes what is called a "deviation card," namely, a table showing the corrections or errors of the compass on the various headings of the ship. I was

METHODS OF CARRYING INSTRUMENTS AND BAGGAGE IN NORTHERN CANADA

shown at St Johns, N. F., last September, a card furnished to a coast liner by a New York compass-adjuster. This card was so manifestly wrong and impossible that, if the captain himself had not suspected its incorrectness and had not made observations at the earliest opportunity when his vessel left port, she would surely have gone ashore.

When some years ago a great liner was wrecked by going on the rocks, there was a great deal said about "local magnetic attraction of the rocks," where, as a matter of fact, practically no attraction existed. It is of interest to know, however, that the same man who had adjusted the compasses on board that liner had previously performed a similar duty on a private yacht whose owner, a scientific man, found just in time that grave errors and "misadjustments" had been made. This may be simply a coincidence, but there is no question that a captain cannot wholly trust to adjustments made for him, and that he must have the means of checking up as often as possible. For that purpose he must know, in the first place, just what the correct or undisturbed "variation" or direction of the compass is in all the waters he is likely to traverse.

LOCAL ATTRACTIONS OF THE COMPASS

One further source of danger to navigation must be cited. A number of regions have been found which attract the compass, due frequently to large local deposits of magnetic iron ore. These regions thus have the same effect as the iron on board ship, with this difference, however, that, in general, they exert a constant effect, which, when once determined, can thereafter be allowed for. For example, the Madeiras, the Bermudas, and, in general, islands of volcanic origin are places of more or less pronounced local attraction. Along the inner passage from Seattle to Alaska, there are several places where the attraction from the shore is so strong as

MAGNETIC OBSERVER AT WORK IN CANADA

MOSQUE AT MAHUN, PERSIA

to seriously affect ship's compasses a mile away. Did the mariner not know of them or not allow for their effect while passing them during the night or in fog, his vessel would surely go ashore.

It is a part of the work of a "magnetic survey of the earth" to locate the areas of local magnetic attraction and to make known their effect for the guidance of the mariner.

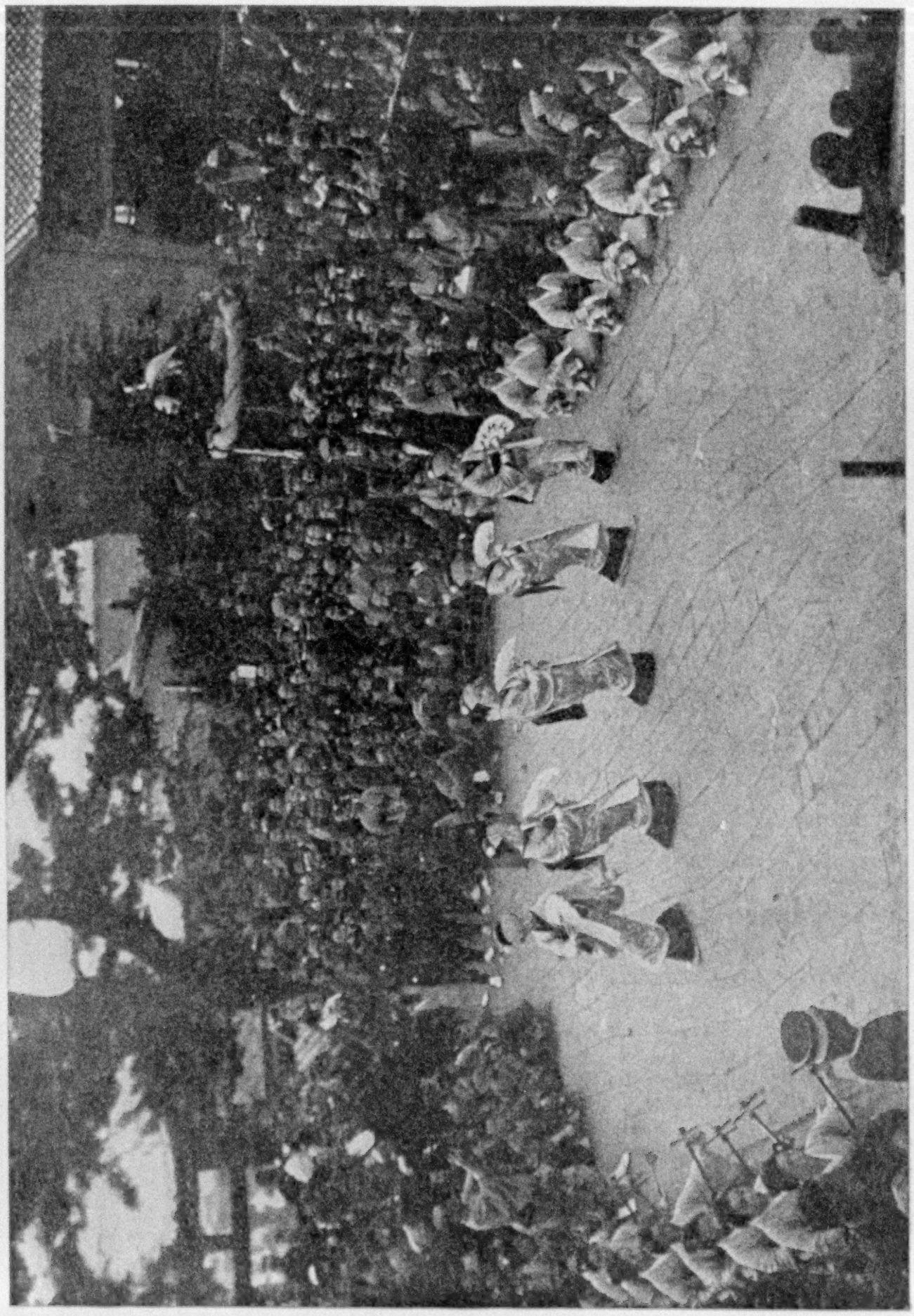
THE DUKE OF THE ABRUZZI IN THE HIMALAYAS

IN recent addresses to the Alpine Club at Turin, and to the Royal Geographical Society of Rome, the Duke of the Abruzzi spoke on his Himalayan explorations of 1909. May and June were passed in unsuccessful efforts to ascend the huge pyramidical mountain known as K^2. From the base camp at Rdokass, near the center of the Baltero glacier, an advance bivouac was made at the foot of the southern wall of K^2. Unavailing efforts were made to locate practicable trails on the east and west sides, but everywhere were either very steep ridges of loose, broken rock or sheer precipices and impassable glaciers.

However, the Duke attempted an ascent up the east-southeast ridge, where the conditions were so difficult and dangerous as to cause him to turn back at an altitude of about 16,000 feet. A second unsuccessful attempt was made on the west flank. The upper basin of the Austen-Goodwin glacier was surveyed, and the Duke was enabled to get views of the north side of K^2 and of the hitherto unknown district to the east.

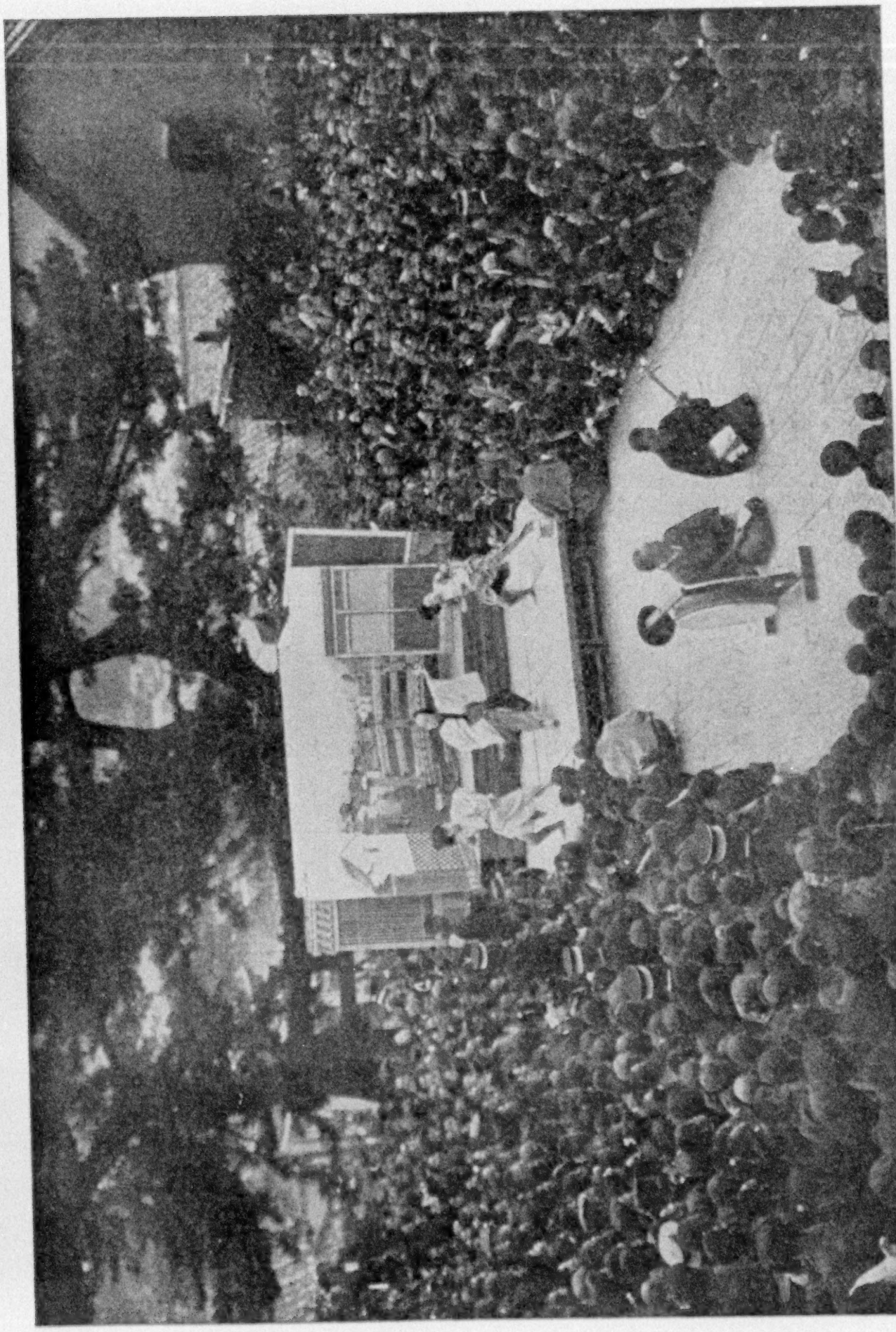
In July efforts were made to ascend Brides Peak, on whose flank a base camp was established on the Chogolisa saddle.

The Duke passed three weeks at an altitude exceeding 21,000 feet, and made two attempts under conditions of great discomfort and considerable danger, owing to the monsoon weather, which brought heavy snow and dense clouds. Reaching 24,000 feet in one attempt, he



DANCING AT A SHINTO RELIGIOUS FESTIVAL: JAPAN

Photo from Rev. H. B. Johnson



JAPANESE THEATER AT RELIGIOUS FESTIVAL

Photo from Rev. H. B. Johnson

Photo from J. R. Joy

A JAPANESE FIRE BRIGADE DRILLING

attained on his second definite climb, on July 18, with two guides, the record height on Brides Peak of 24,583 feet. The ridges were dangerous and difficult, while further progress was barred by a dense fog which enveloped the party about 500 feet below the summit, which is 25,119 feet.

This unsurpassed height of 24,583 feet supplants the previous world record of 24,000 feet on Mount Kabru, attained by Norwegian mountaineers in 1908.

The Duke supplemented his strictly mountaineering feats by extended surveys, hypsometrical observations, meteorological records, and other scientific data of value and interest. His work is entitled to the highest possible recognition from geographers of all nations.

A. W. G.

IN VALAIS

By Louise Murray

Illustrations from Photographs by Jullien Frères, Geneva

APROPOS of all the present talk about woman suffrage, let us take a glance at the inhabitants of a small village in Switzerland, or, more accurately, the dwellers on the mountain slopes about Champéry, in the canton of Valais, that sequestered and charming hamlet which lies contentedly at the feet of its famous neighbor, the Dent du Midi.

There the sturdy peasant women have solved the "equal-rights" matter to their own satisfaction. Votes were never a factor in the question, but trousers were, and have been calmly appropriated for their own use; so it is as man's equal in freedom of movement and attire, at least, that the feminine half of the community tend their herds, cut hay on the almost perpendicular hillsides, and clamber up and down the stony and tortuous paths leading to their mountain homes.

If Americans are as yet in almost total ignorance of this little spot, successfully hidden for years at the extreme end of the lovely Val d'Illiez, it is by no means undiscovered, and, owing to the recent foreign invasion, these fair traitors to the conventional skirt have become as shy as the proverbial chamois, and one must seek them upon their own heights during the summer season, when the new electric tramway which has supplanted the old-time diligence renders this village almost too accessible to the ever-growing tourist army.

En route from Italy, one leaves the Simplon line at Saint Maurice, rides for a few minutes in a shuttle train of doubtful comfort, and, arriving at Monthey, takes the tram, which immediately commences an ascent of the fertile valley. Through vineyard and chestnut grove, over roaring mountain streams and past various hamlets, the little train wends its way, ever upward.

Leaving the heat of the plain below, one gradually emerges into an atmosphere of crystalline coolness. Champéry, the end of the railway and the last village in the valley, lies 3,500 feet above the sea. Except its bracing air, one is unconscious of the altitude, as all about tower the infinitely greater heights of the Dents du Midi and the Dents Blanches, their white "teeth" so dazzling in the sunlight that one welcomes the almost ever-present curtain of cloud which veils their brightness. Some 300 feet below the village the rapid and noisy Vièze, home of that delectable fish, the "ombre," rushes down the bed of the valley from its source in the Col de Coux, another mountain, at whose summit lies the frontier of Savoy and a customs-house, and from whence one may

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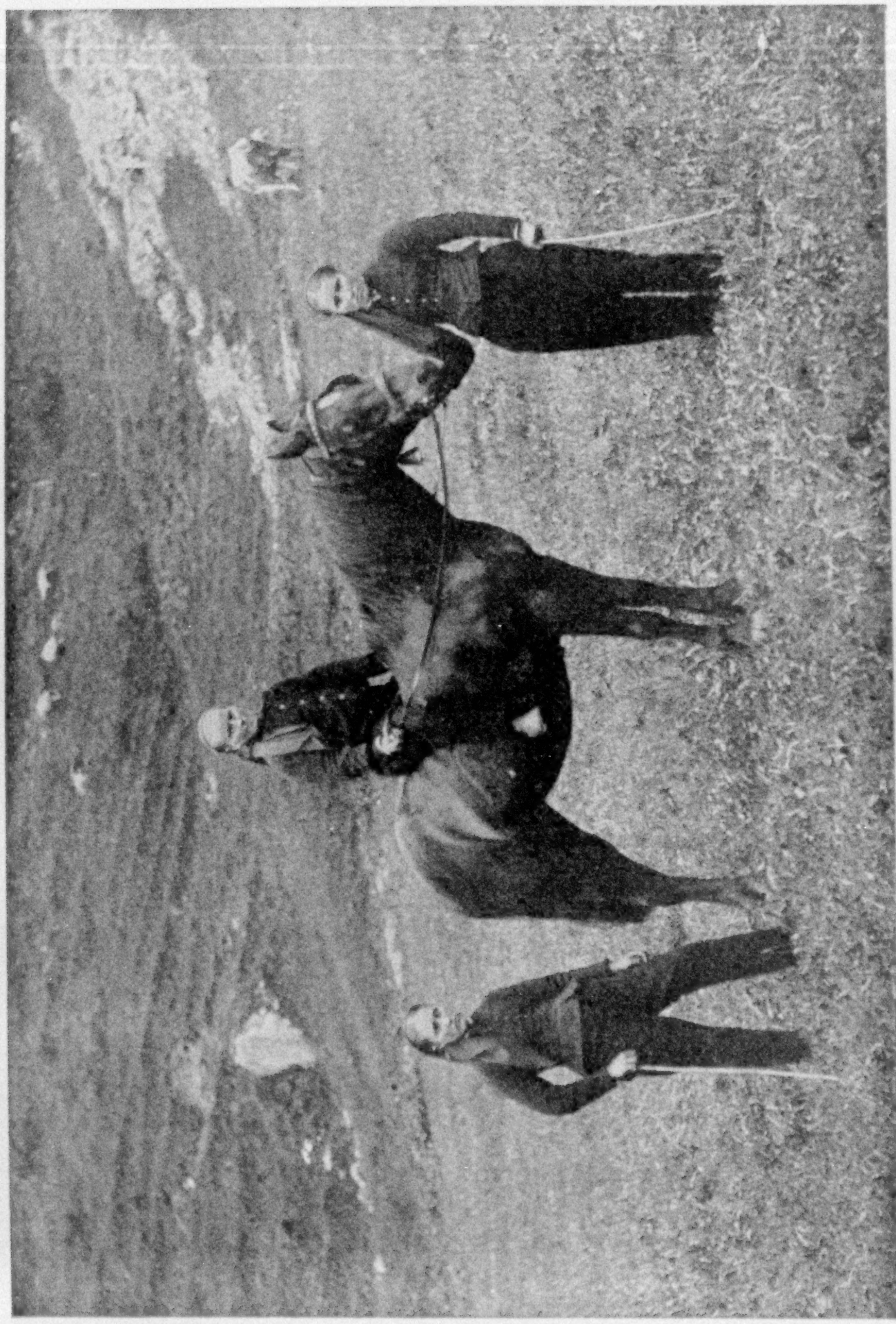

FEMININE COSTUMES OF CHAMPÉRY

ON A COUNTRY ROAD NEAR CHAMPÉRY

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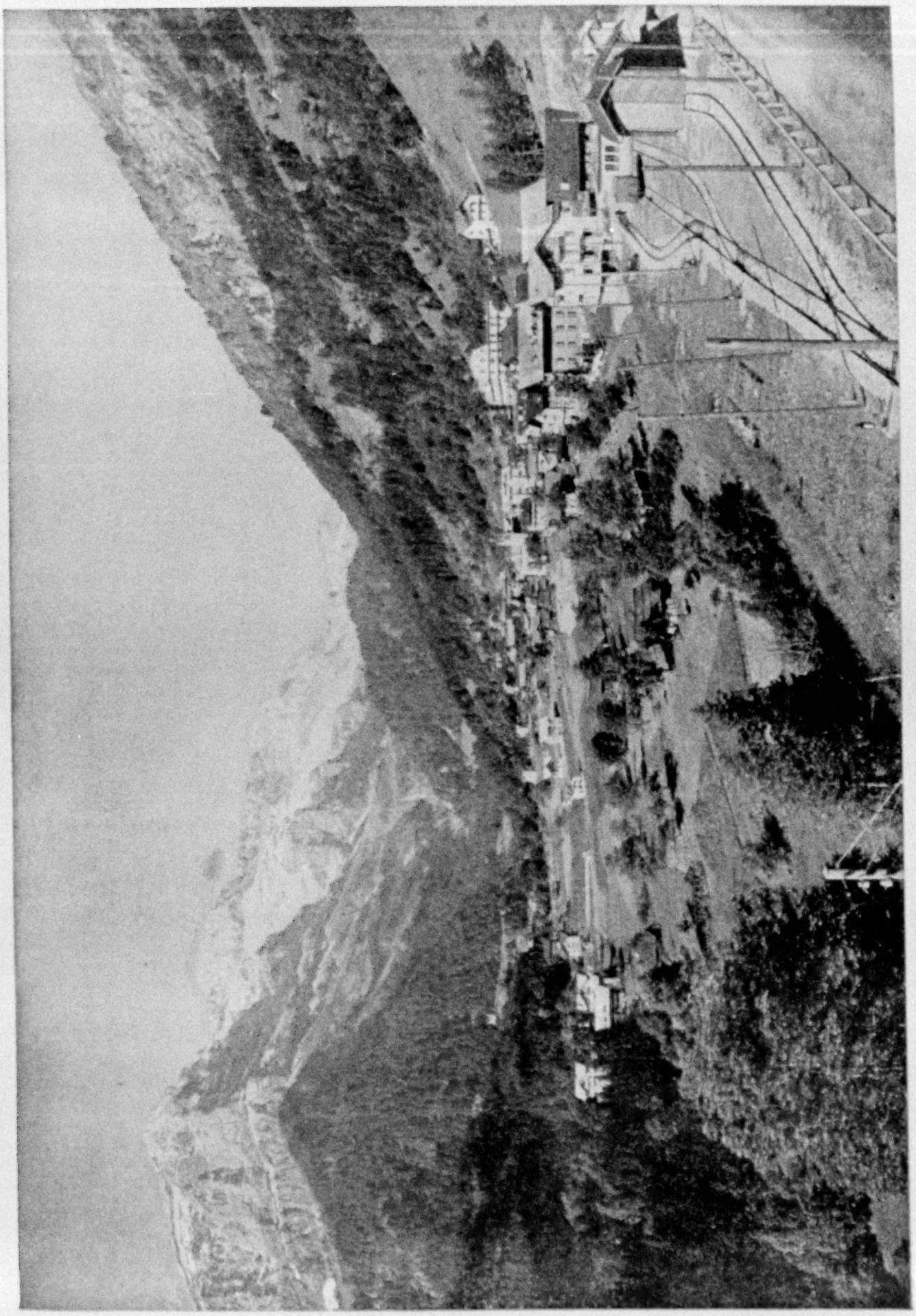
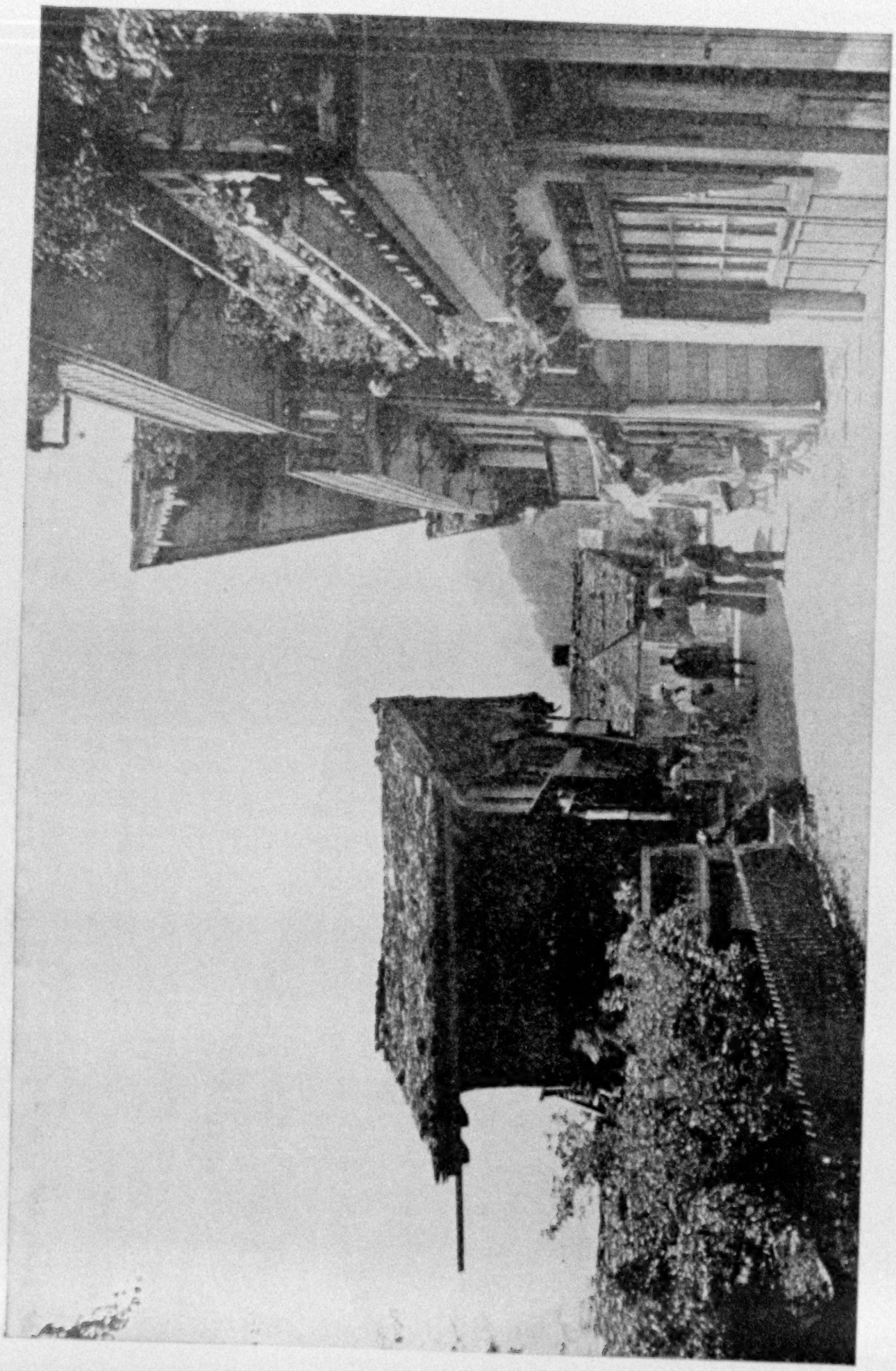
THE DENTS DU MIDI



CHAMPÉRY AND THE "DENTS BLANCHES"



THE VILLAGE STREET: CHAMPÉRY

"LE CALVAIRE"

continue one's walk in France to Chamonix.

The country abounds in walks and climbs to suit the most expert or inexperienced mountaineer. First and foremost of these is the ascent of the Dent du Midi, more than 10,000 feet in height. Of its seven teeth, the Haute Cime is most popular and least dangerous. Parties usually leave Champéry in the afternoon, sup at Bonaveau, snatch a few hours of sleep, and are off before dawn in order to reach the summit for a far-reaching panorama of the sun-kissed Alps awaking from their sleep.

It was at this little chalet of Bonaveau that one party, finding their hopes of an ascent shattered by torrential rain, resolved to play bridge and amuse themselves as best they could until the wee sma' hours; but "English as she is spoke" and accompanying laughter evidently jarred upon the proprietor's nerves, for in the morning their modest bill was embellished with the strange item, "Extra: Pour bruit fait pendant la nuit (for noise made during the night), 5 francs."

To return to the village, its one street lined by chalets with gayly flowering window-boxes and neat gardens, hotels, pensions, and little shops, let us occupy ourselves with the cosmopolitan throng that wanders back and forth on any August day.

The Hotel Dent du Midi, Champéry's largest and most modern hostelry, is the best point of vantage for such a survey. Choosing a comfortable chair from beneath its striped awnings, we call a waitress wearing one of the typical scarlet kerchiefs on her head to bring us tea. While waiting we may listen to the orchestra and marvel at the many countries of the world represented in this small corner of it. The English and French element predominate, and as yet the American is in the minority, but electricity, steam heat, and all the commodities of modern life that especially recommend a place to his luxury-loving heart are fast doing away with its former simplicity. What a field in which to study human nature, national characteristics, and that intangible something which stamps indelibly the types of each country for its own.

There goes a former prime minister of Austria off for a walk with his beautiful wife, his fox terriers bounding in glee at his heels. A distinguished Roman and his two sons are returning from an all-day climb, their arms filled with Alpine roses. Here comes an English army officer, pack on back and alpenstock in hand, off with his guide for "the Dent." A little Indian princess tosses a bit of cake to her squirming and anticipatory dachshund. Out in the garden four hilarious Parisiennes are settling their accounts at bridge. A Greek countess flicks the ashes from her cigarette, as she sips her tea in company with a young Roumanian. An Italian admiral strolls into the "poste," and the inevitable American girl returns from tennis. So one might continue indefinitely, for Swiss, Dutch, Russian, Hungarian, and even Egyptian are all represented in this out-of-the-way little place to such an extent that during the annual tennis tournament lodging of any sort, be it ever so homely or primitive, is at a premium.

It is in June, however, that Champéry is at its loveliest. Then the fields are carpeted with masses of wild flowers of the most extraordinary beauty and variety, delicate orchid-like blossoms that might have been hot-house grown mixing with the more sturdy ones, and it is with real regret that one sees them swept away by the relentless scythe in haying time. In the heart of the village lies the newly restored parish church, with its unique and ancient crown-capped bell-tower, from which a veritable chaos of chimes peal forth on feast days.

Mention of Champéry would not be complete without a word as to its favorite strolls, the "Petit" and "Grand Paradis"—two lovely wooded spots by the rapid Vièze, where one may sit beneath the pines and listen to its noisy music—and "les Galeries," a natural rock formation in the sheer cliff rising from the right bank of the river, and from which a splendid view of the village is to be had.

But it is toward the east, a half hour distant, that we wend our way most frequently, for there lies "Le Calvaire," a stone cross set upon a projecting knoll which dominates the entire Val d'Illiez far down to the peaceful Valley of the Rhone and across to the distant peaks of Chaussy, Gummfluh, and the Mont d'Or glistening in the sun. From this point, midway between the valley and the mountains, seated beneath that cross, eternal symbol of death, one may best watch the mystery of the departing sun as it sinks behind the Col de Coux. Then the veil that hangs all day before the Dent du Midi lifts, and the dying rays slowly flood the mountains' cold, dead whiteness with the rosy glow of life and eternal promise.

Photos from Paul Thompson

A CAR EN ROUTE UP THE WETTERHORN: GRUNEWALD VALLEY, UPPER BERNOIS, SWITZERLAND

A FUNERAL IN THE ALPS IN WINTER

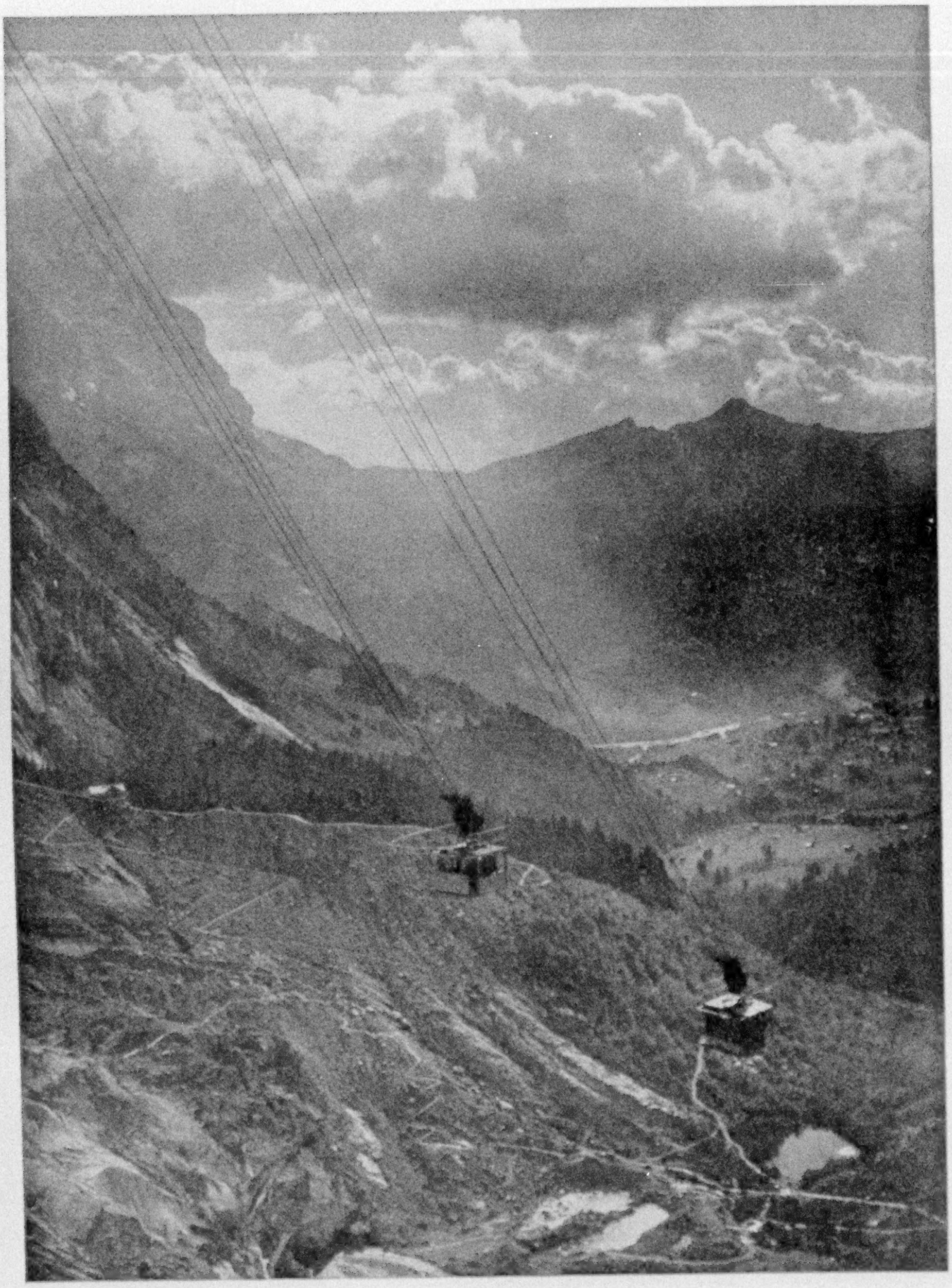


Photo from Paul Thompson

TWO CARS ON THEIR WAY—ONE IS GOING UP AND THE OTHER DOWN: THE WETTERHORN RAILWAY. EACH CAR HOLDS 20 PASSENGERS

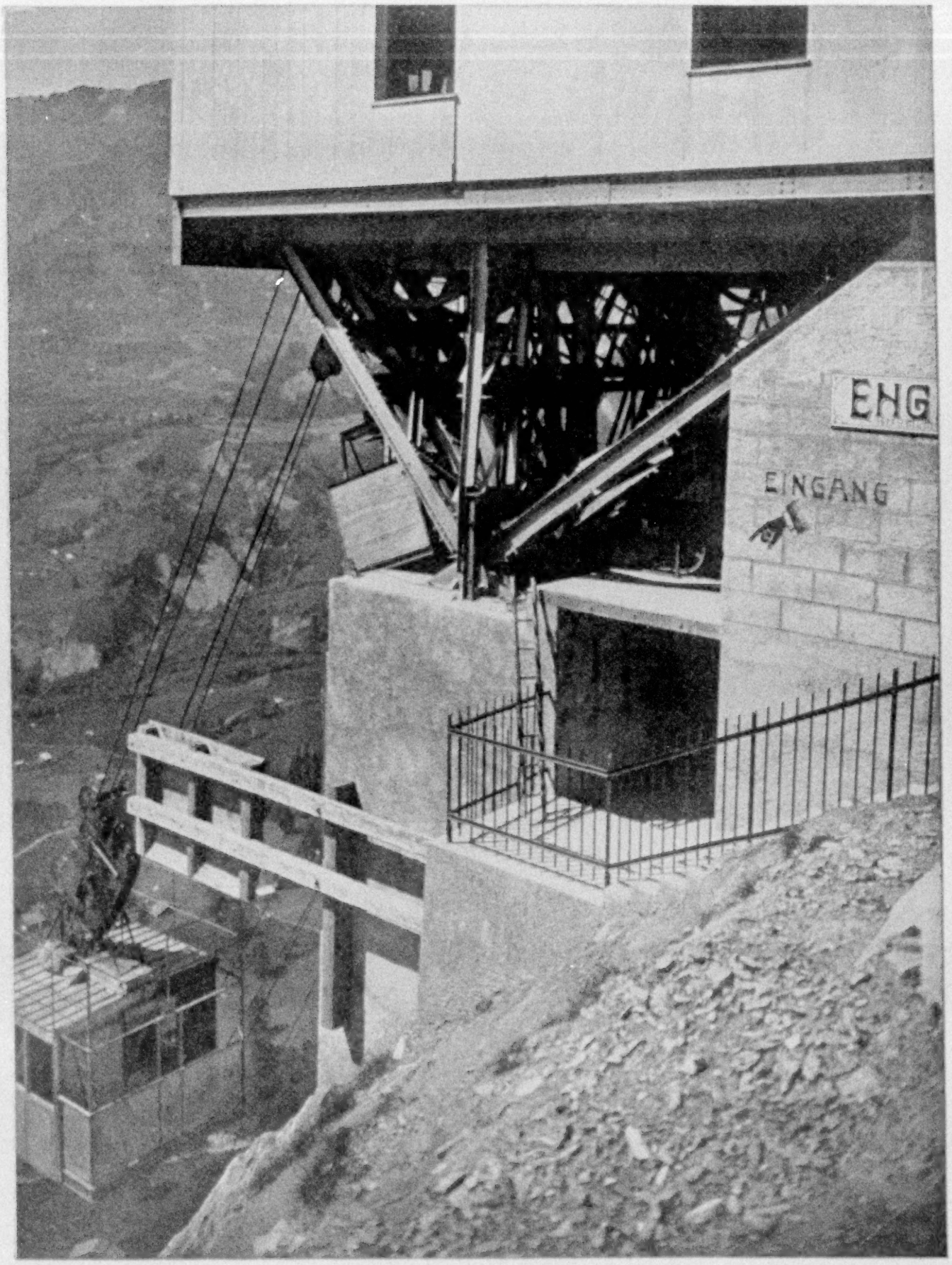


Photo from Paul Thompson

A CAR ARRIVING AT THE UPPER STATION OF THE WETTERHORN : SWITZERLAND

Photo from Paul Thompson

IN THE FRENCH ITALIAN ALPS: USING DOGS FOR CONVEYING GOODS AND PEOPLE DURING THE WINTER MONTHS

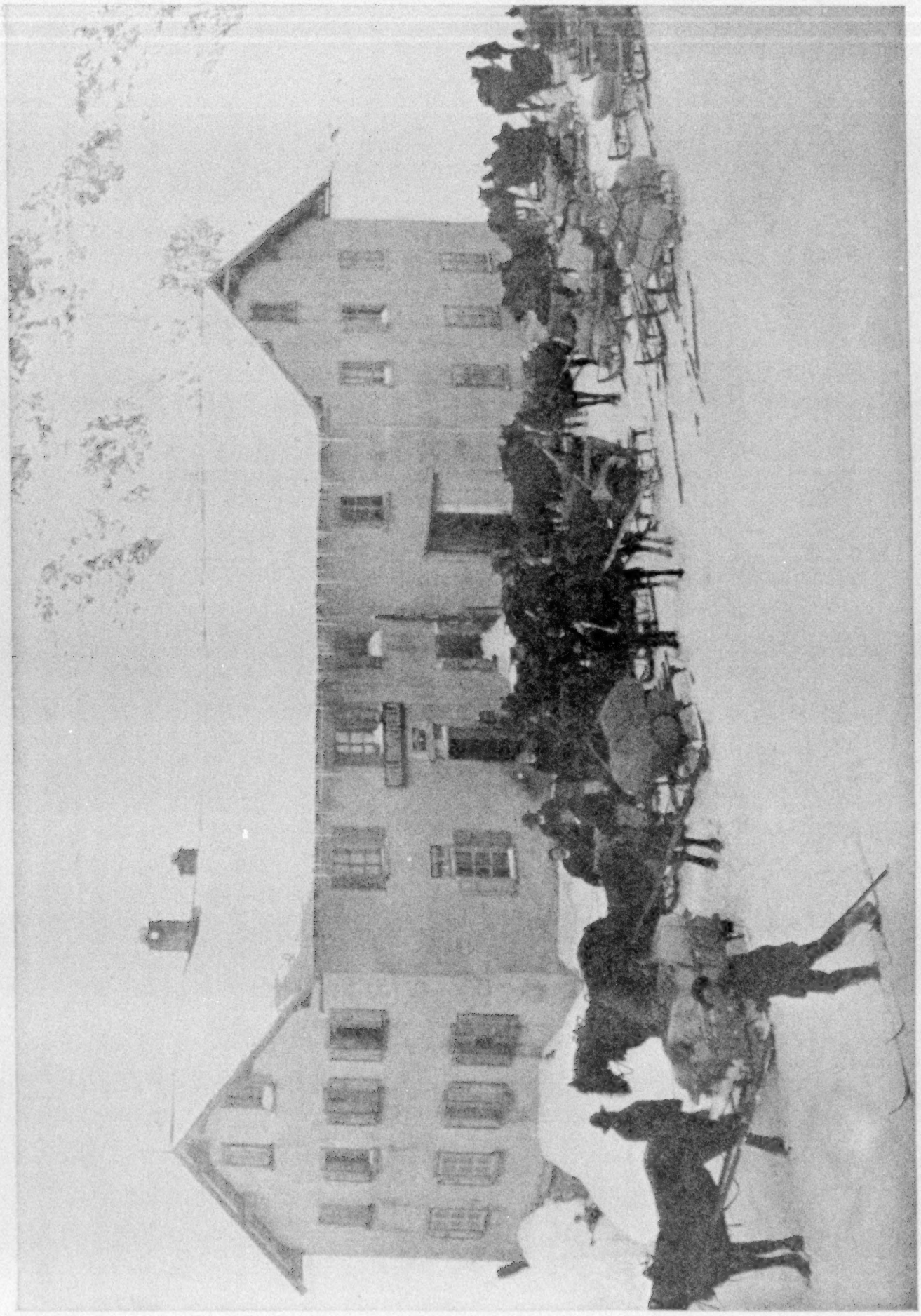


Photo from Paul Thompson

TRAVELERS AT THE HOTEL ON MOUNT FLUELA, IN THE ALPS, IN WINTER

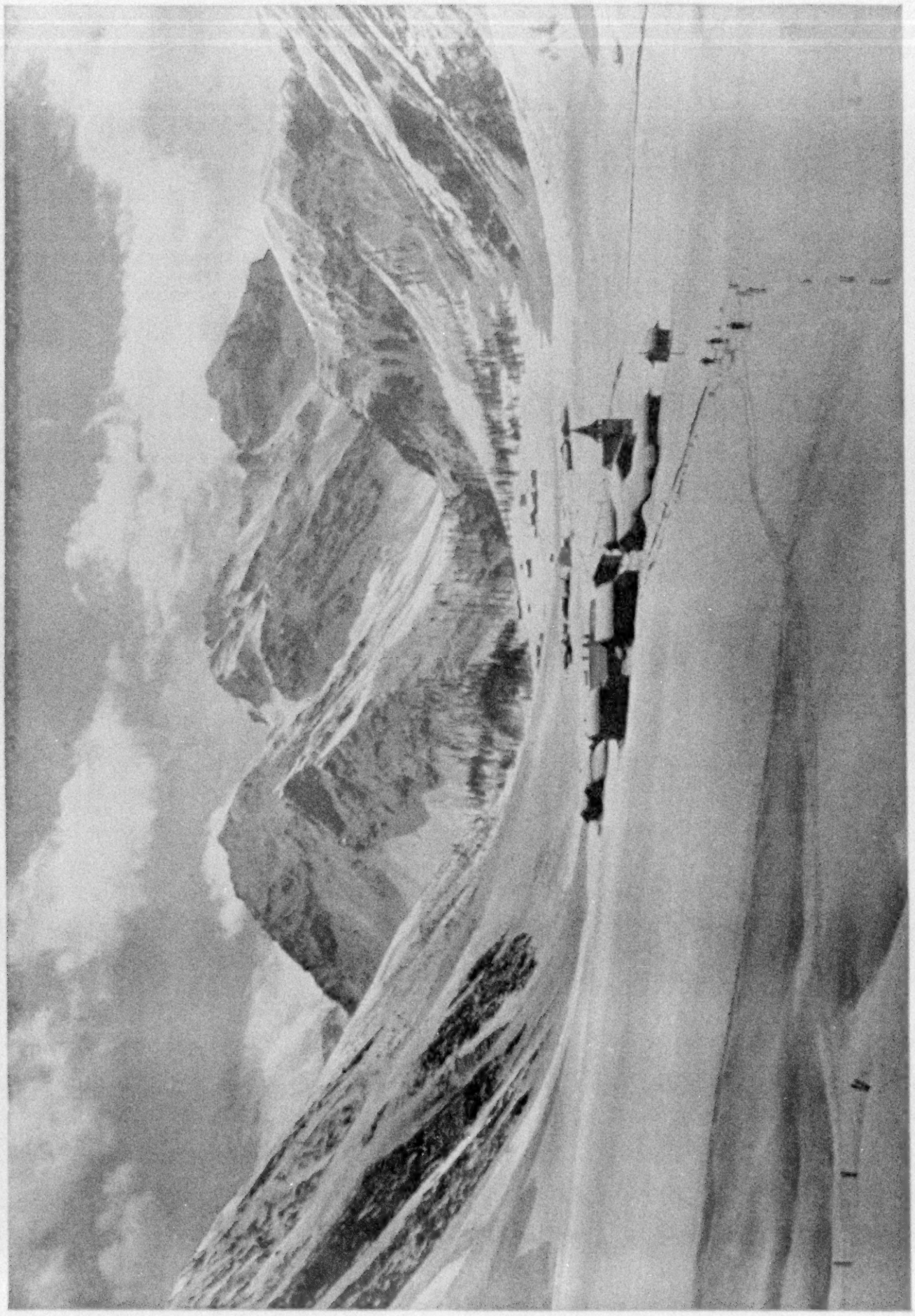
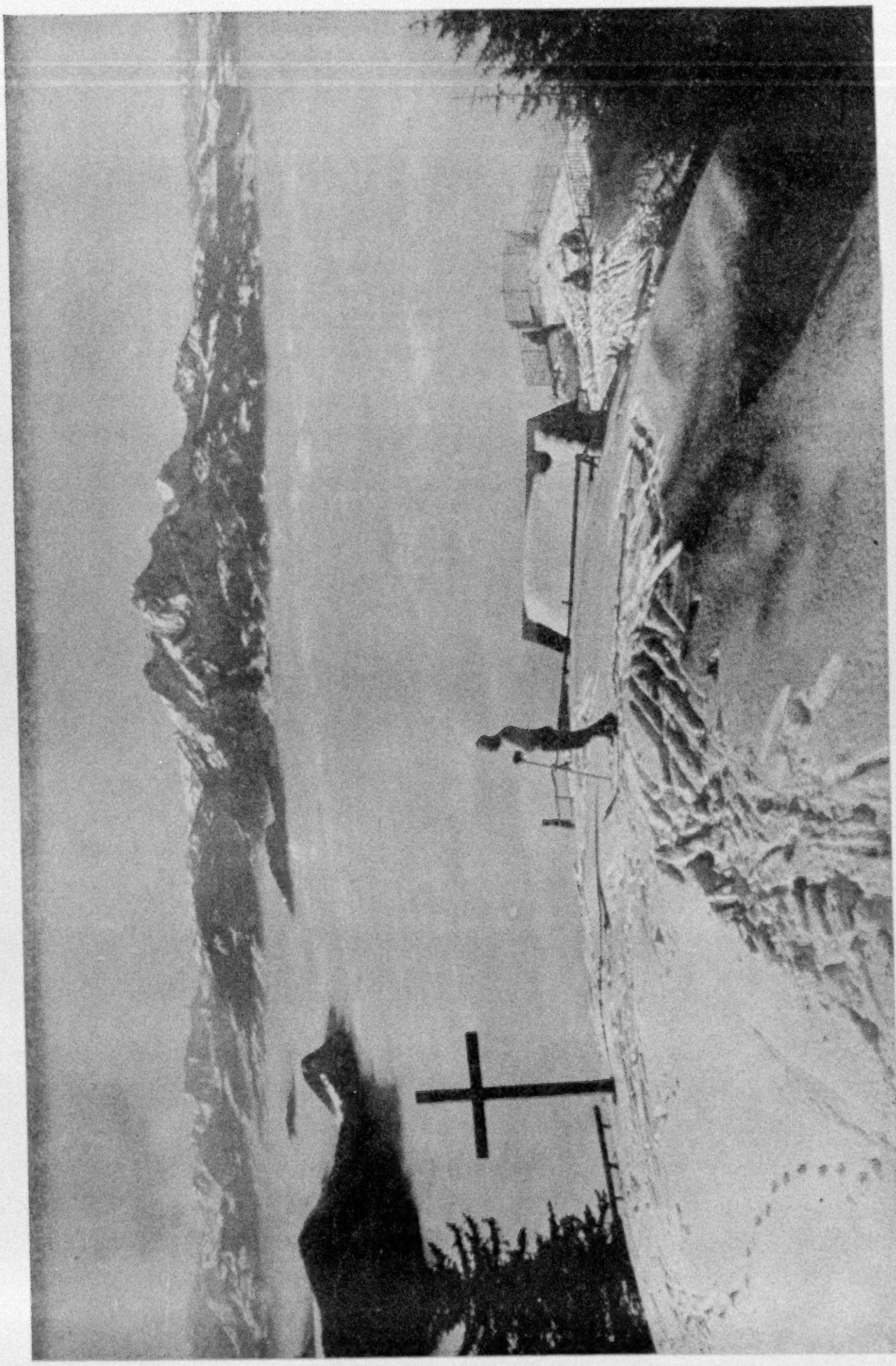
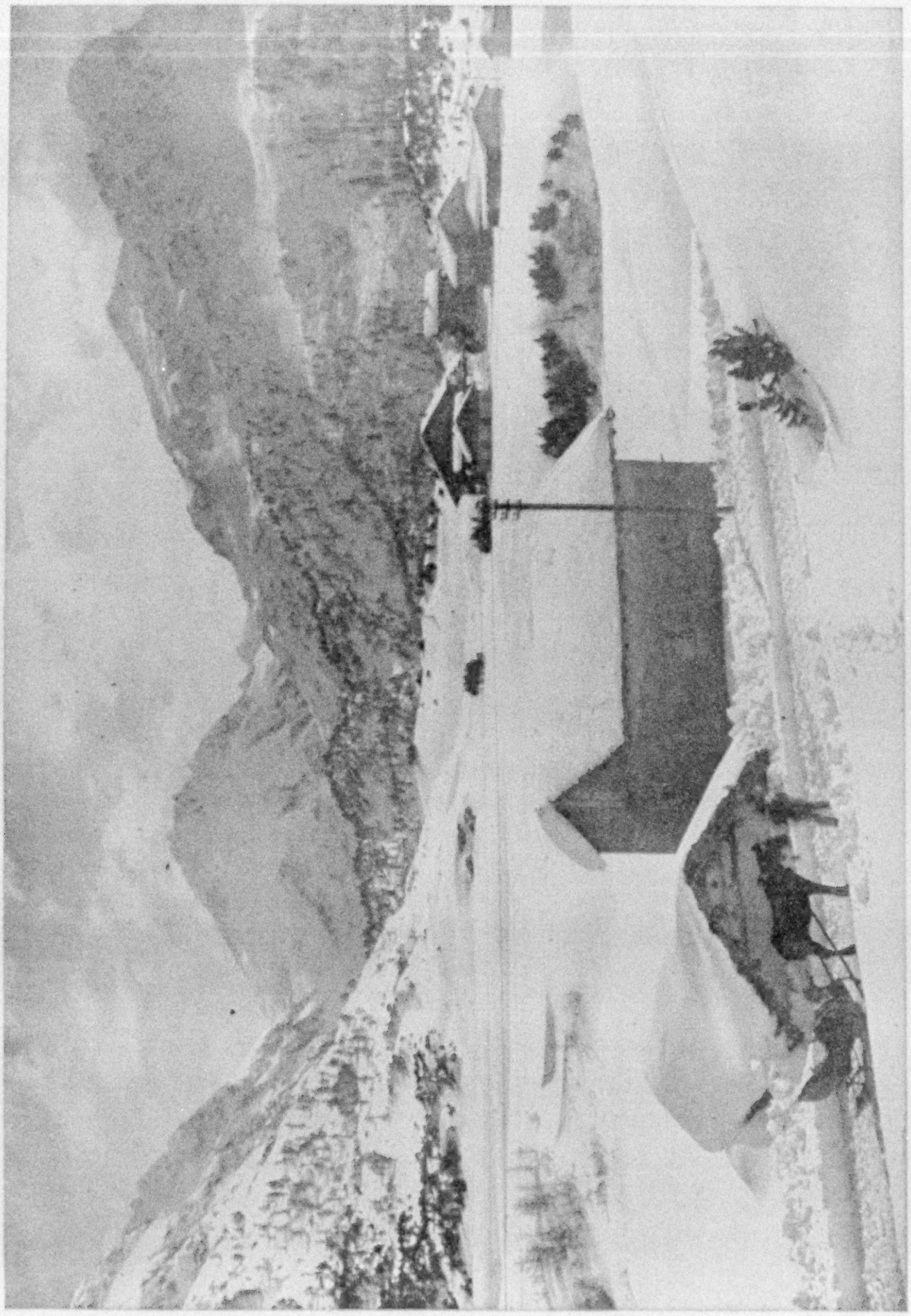


Photo from Paul Thompson

HIGH VALLEY OF DOERFLI-LERTIG BETWEEN THE VALLEY OF DAVOS AND ENGADINE

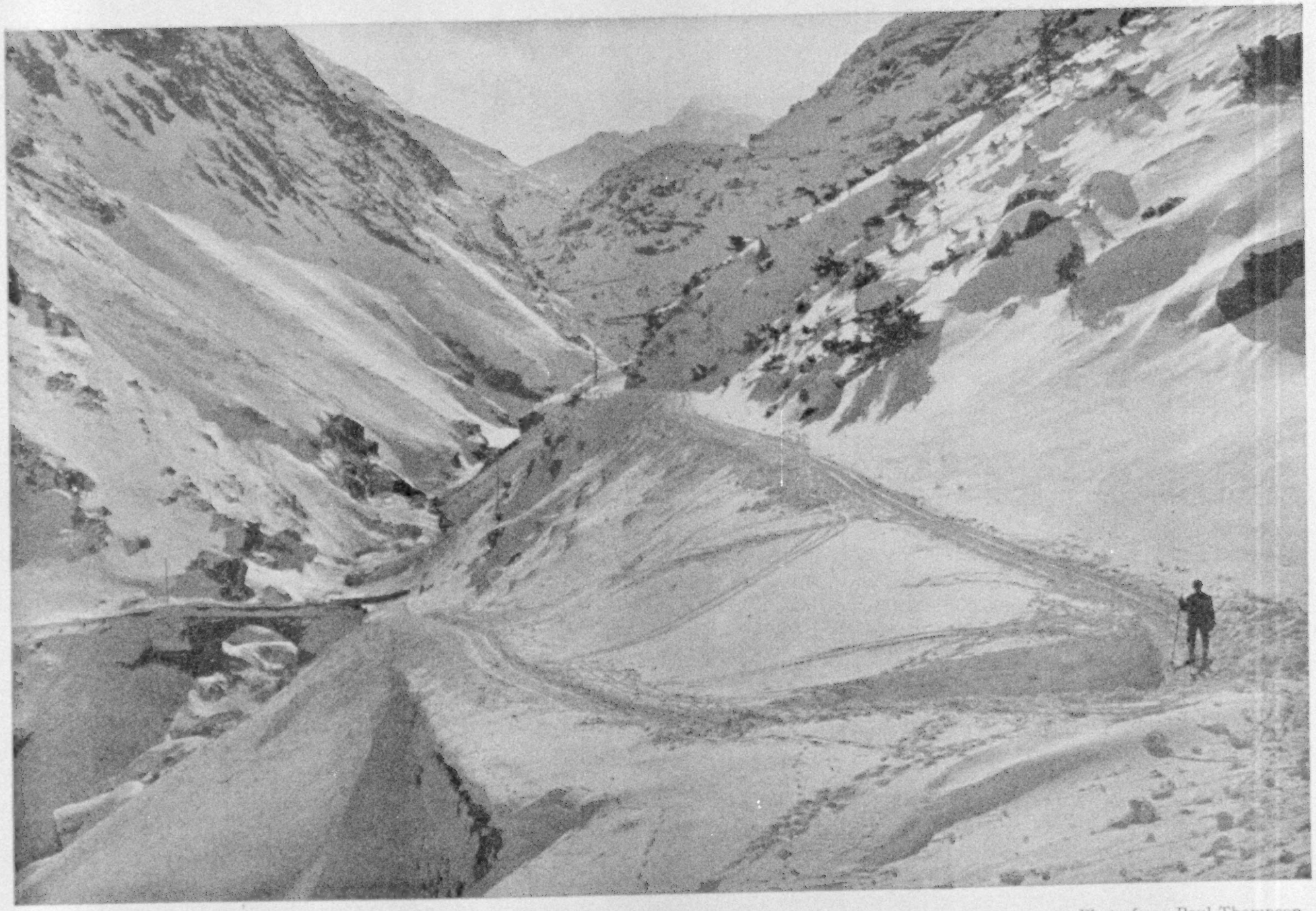


A SEA OF CLOUDS—A RARE SIGHT: TAKEN IN THE ITALIAN ALPS Photo from Paul Thompson



TOP OF MALOJA, UPPER ENGADINE, SWITZERLAND Photo from Paul Thompson

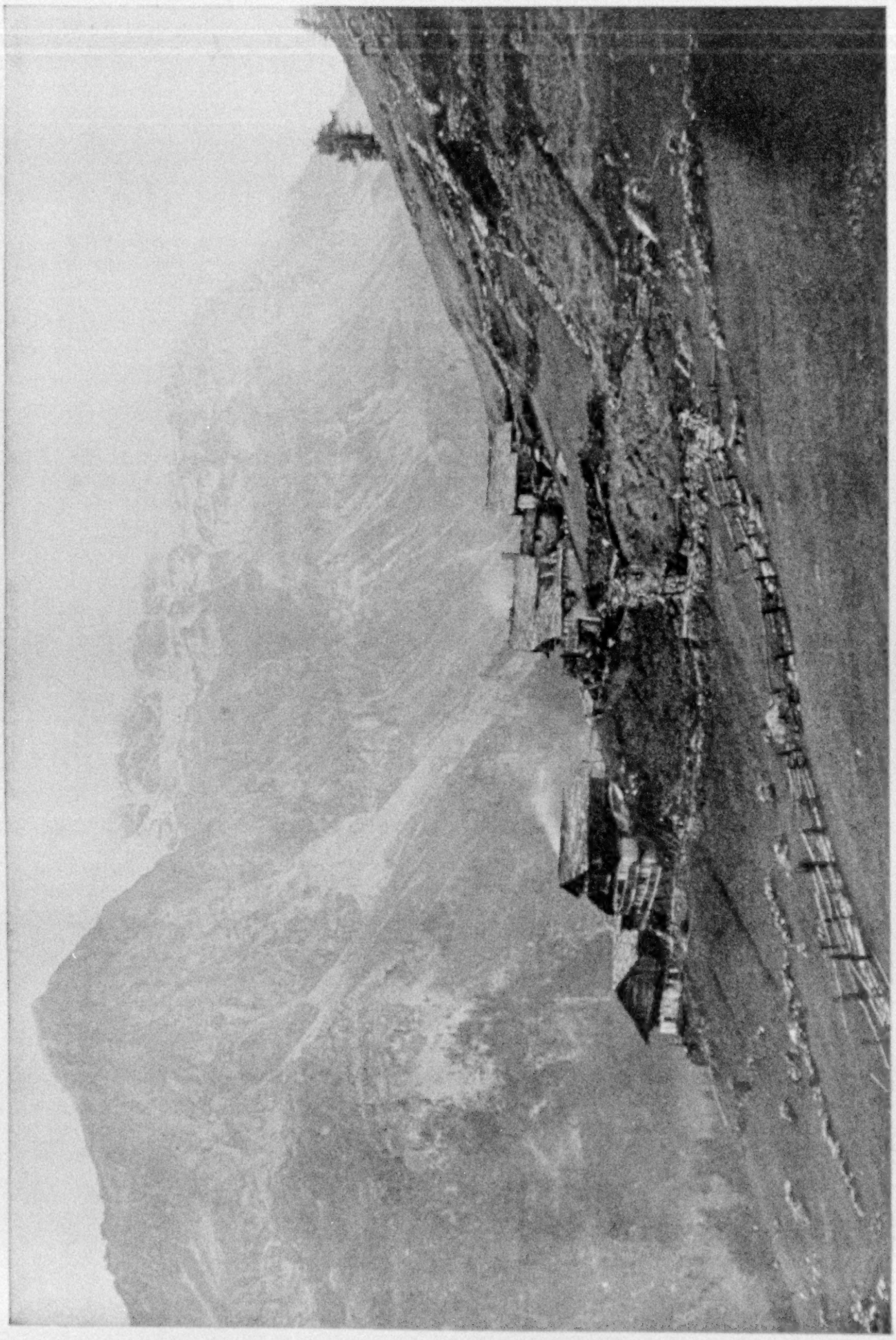
The valley of the Upper Engadine is famous as a health resort, the most popular place being Saint Moritz



THE PASS OF SAINT GOTHARD IN WINTER

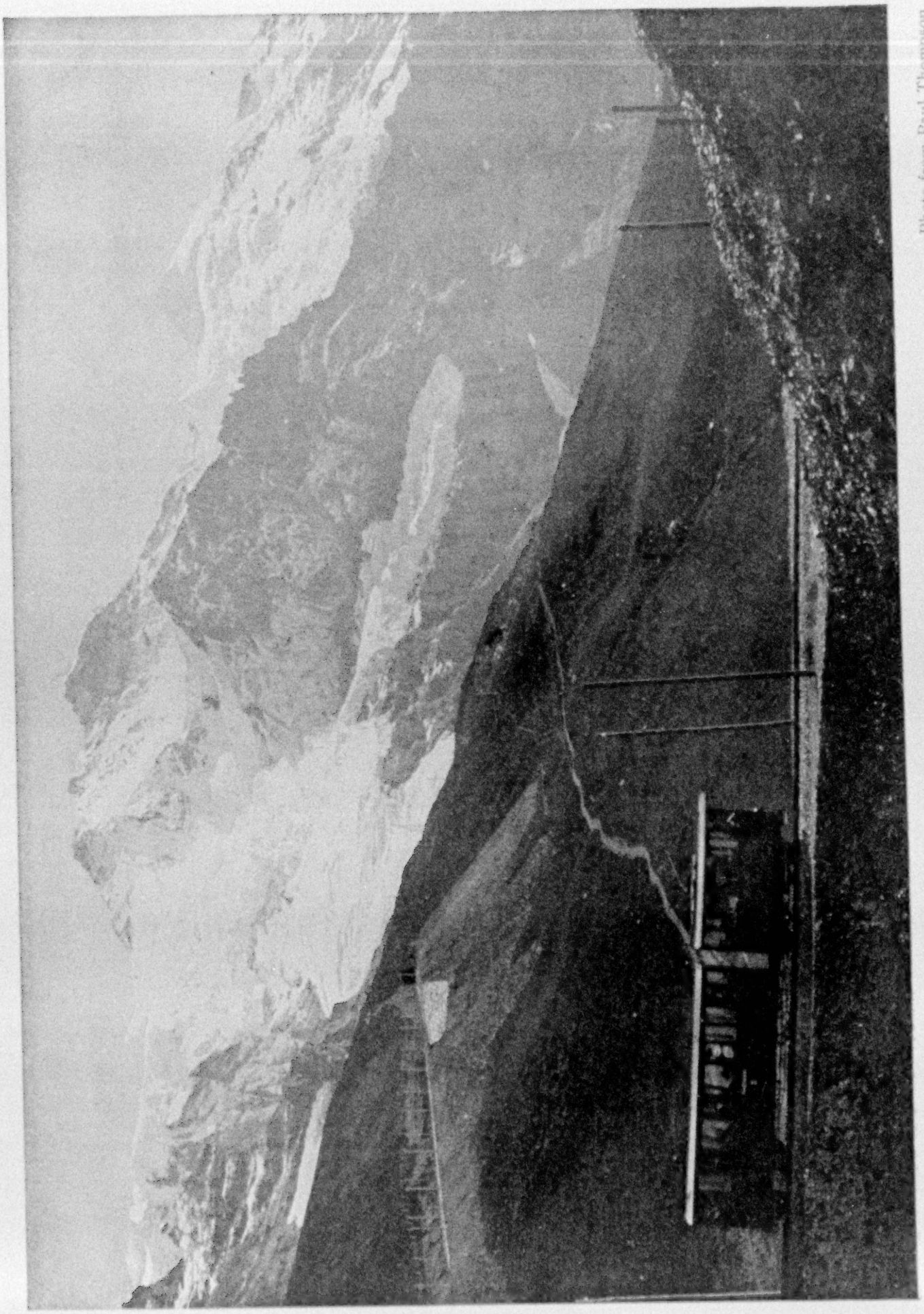
Photo from Paul Thompson

The road over this pass, constructed 85 years ago, is one of the best in the Alps, and is free of snow for four or five months. It is remarkable for the grandeur of its scenery, but has not been much used since the building of the railway and Saint Gothard tunnel.



A VILLAGE IN THE ALPS

Photo from Paul Thompson



TRAIN GOING UP THE JUNGFRAU

Photo from Paul Thompson

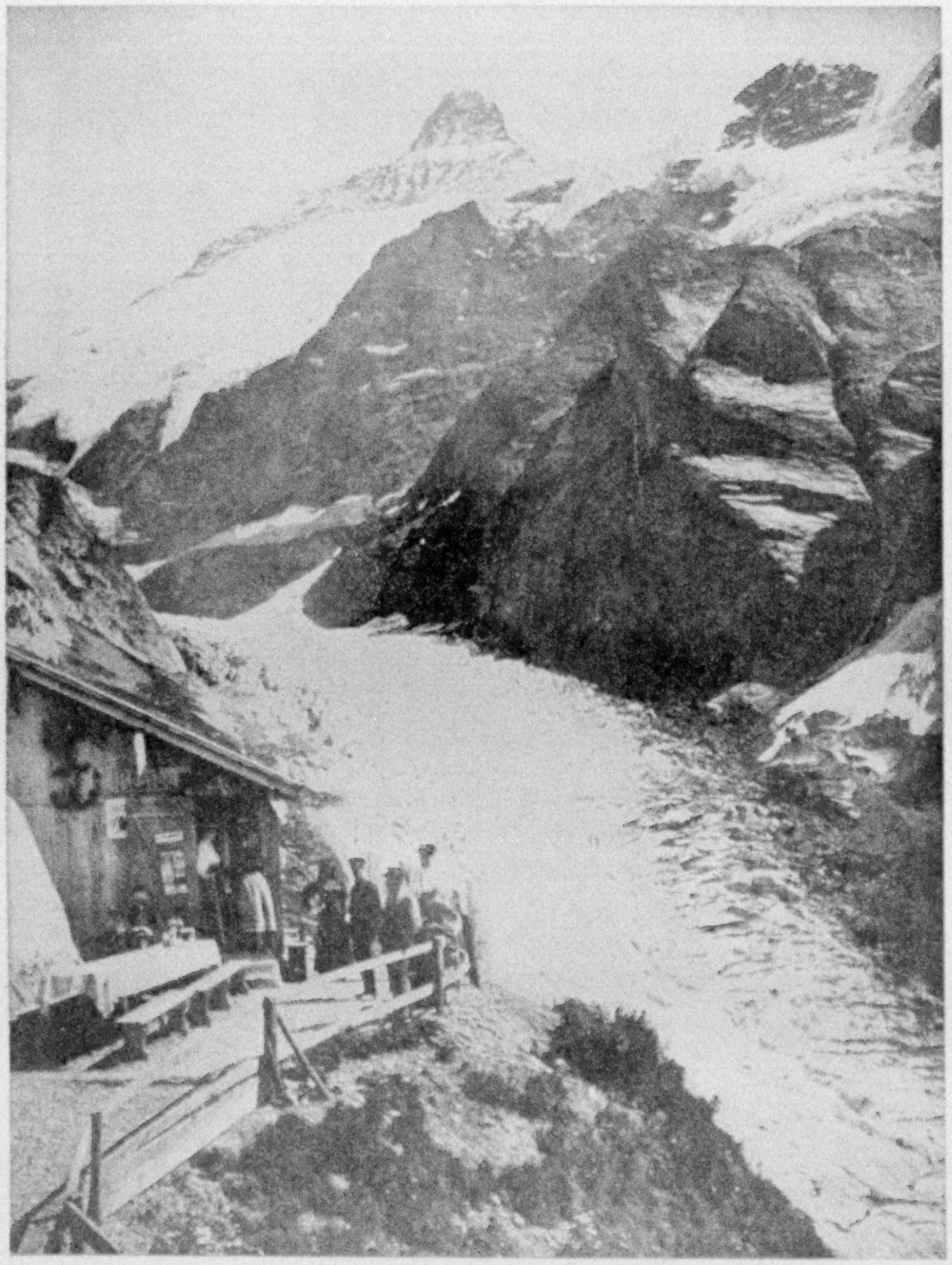


Photo from Paul Thompson

THE STATION RESTAURANT, 2,338 METERS IN HEIGHT, ON THE WETTERHORN: THE GLACIER OF GRUNEWALD IN THE DISTANCE

DEER FARMING IN THE UNITED STATES*

That the rising prices of beef and mutton in the United States can be partially overcome by raising deer for venison, is maintained by Dr C. Hart Merriam, Chief of the United States Biological Survey. According to Doctor Merriam elk meat can be produced cheaper than beef or mutton in many sections of the United States, and, with comparatively little effort, it is possible to make raising deer for venison as profitable as any other live-stock industry. Every one who has seen the large numbers of deer browsing on private estates in England as peacefully as cattle and sheep wonders why American enterprise has not long since developed breeding deer for food in this country.

SEVERAL species of deer are suited for breeding in inclosures in the United States; the axis deer, the Japanese and Pekin sikas, the red and the fallow deer of Europe, and especially the Rocky Mountain elk, or wapiti, and the Virginia deer. While experiments with the foreign species named offer every promise of success to the owners of American preserves, the elk and Virginia deer are recommended as best adapted for the production of venison in the United States.

The flavor of venison is distinctive, though it suggests mutton rather than beef. In chemical composition it is very similar to beef. A lean venison roast before cooking has been found to contain on an average 75 per cent of water, 20 per cent of protein or nitrogenous material, and 2 per cent of fat; a lean beef rump, some 65 to 70 per cent of water, 20 to 23 per cent of protein, and 5 to 14 per cent of fat; and a lean leg of mutton, 67 per cent of water, 19 per cent of protein, and 13 per cent of fat.

The general popularity of venison is so great and the demand for it so widespread that overproduction is improbable. The other products of the deer—skins and horns—are of considerable importance, and in countries where deer are abundant, and especially where large herds are kept in semi-domestication, the commerce in both is very extensive.

THE ROCKY MOUNTAIN ELK, OR WAPITI

The wapiti, known generally in America as the elk, is, next to the moose, the largest of our deer. It was once abundant over the greater part of the United States, whence its range extended northward to about latitude 60° in the Peace River region of the interior of Canada. In the United States the limits of its range eastward were the Adirondacks, western New Jersey, and eastern Pennsylvania; southward it reached the southern Alleghenies, northern Texas, southern New Mexico, and Arizona; and westward the Pacific Ocean.

At the present time the elk are found only in a few scattered localities outside of the Yellowstone National Park and the mountainous country surrounding it, where large herds remain. Smaller herds still occur in Colorado, western Montana, Idaho, eastern Oregon, Manitoba, Alberta, British Columbia, and the coast mountains of Washington, Oregon, and northwestern California. A band of the small California Valley elk still inhabits the southern part of the San Joaquin Valley.

The herds that summer in the Yellowstone National Park and in winter spread southward and eastward in Wyoming are said to number about 30,000 head, and constitute the only large bands of this noble game animal that are left. Although protected in their summer ranges and partially safeguarded from destruction in winter by the State of Wyoming, there is yet great danger that these herds may perish from lack of food in a succession of severe winters. Partial provision for winter forage has been made within the National Park, but the supply is inadequate for the large num-

* Abstracted from Farmers' Bulletin 330. By D. E. Lantz, U. S. Biological Survey

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bers of animals. Further safeguards are needed to place the Wyoming elk herds beyond the reach of winter starvation.

In addition to the wild herds, there are a considerable number of elk in private game preserves and parks, as well as in nearly all the public zoological parks and gardens of this country. The herds in captivity form the nucleus from which, under wise management, some of the former ranges of this animal may be restocked and from which a profitable business of growing elk venison for market may be developed. At the present time this species affords a most promising field for ventures in breeding for profit.

HABITS OF ELK

The elk is both a browsing and a grazing animal. While it eats grasses freely and has been known to subsist entirely upon pasture, it seems to prefer a mixture of grass and browse.

The elk is extremely polygamous. The adult bulls shed their antlers annually in March or April, and new ones attain their full size in about ninety days. The "velvet" adheres until about August. While the horns are growing the bulls usually lead solitary lives; but early in September, when the horns are fully matured, the mating season begins. Fights for supremacy then take place, and the victor takes charge of as many cows as he can round up and control.

Although the elk is less prolific than the common deer and some other species that have been bred in parks, it increases fully as rapidly as the common red deer of Europe. Moreover, it makes up for any lack of fecundity by its superior hardiness and ease of management. It has been acclimatized in many parts of the world, and shows the same vigor and hardiness wherever it has been transplanted. In Europe it has been successfully crossed with the Altai wapiti and the red deer, and in both instances the offspring were superior in size and general stamina to the native stock.

The flesh of the elk, although somewhat coarse, is superior in flavor to most venison. That of the bulls is in its best condition about the time the velvet is shed. In October their flesh is in the poorest condition. As the open season for elk is usually in October and November, and only bulls are killed, it follows that hunters often obtain the venison when it is poorest. The meat is not best when freshly killed, but should be left hanging for four or five days before it is used.

ELK FARMS

With few exceptions the early attempts to domesticate elk were made by men who were wealthy enough to disregard all thought of profit in raising them. They were usually placed under the care of servants, and the bucks were left uncastrated until they became old and unmanageable. Soon the serious problem of controlling them outweighed the novelty of their possession, and one by one the attempts at domestication were abandoned.

A desire to preserve this important game animal has caused a renewal of attempts to breed it in confinement, and at present there are small herds under private ownership in many places in the United States. The Biological Survey has recently obtained much information from owners of herds in regard to their experience in breeding and rearing the animals, and also their opinions as to the possibility of making the business of raising them profitable. Of about a dozen successful breeders, nearly all are of the opinion that raising elk for market can be made remunerative if present laws as to the sale of the meat are modified.

One especially important fact has been developed by the reports from breeders. It is that the elk readily adapts itself to almost any environment. Even within the narrow confines of the paddocks of the ordinary zoological park the animal does well and increases so that periodically the herds have to be reduced by sales.

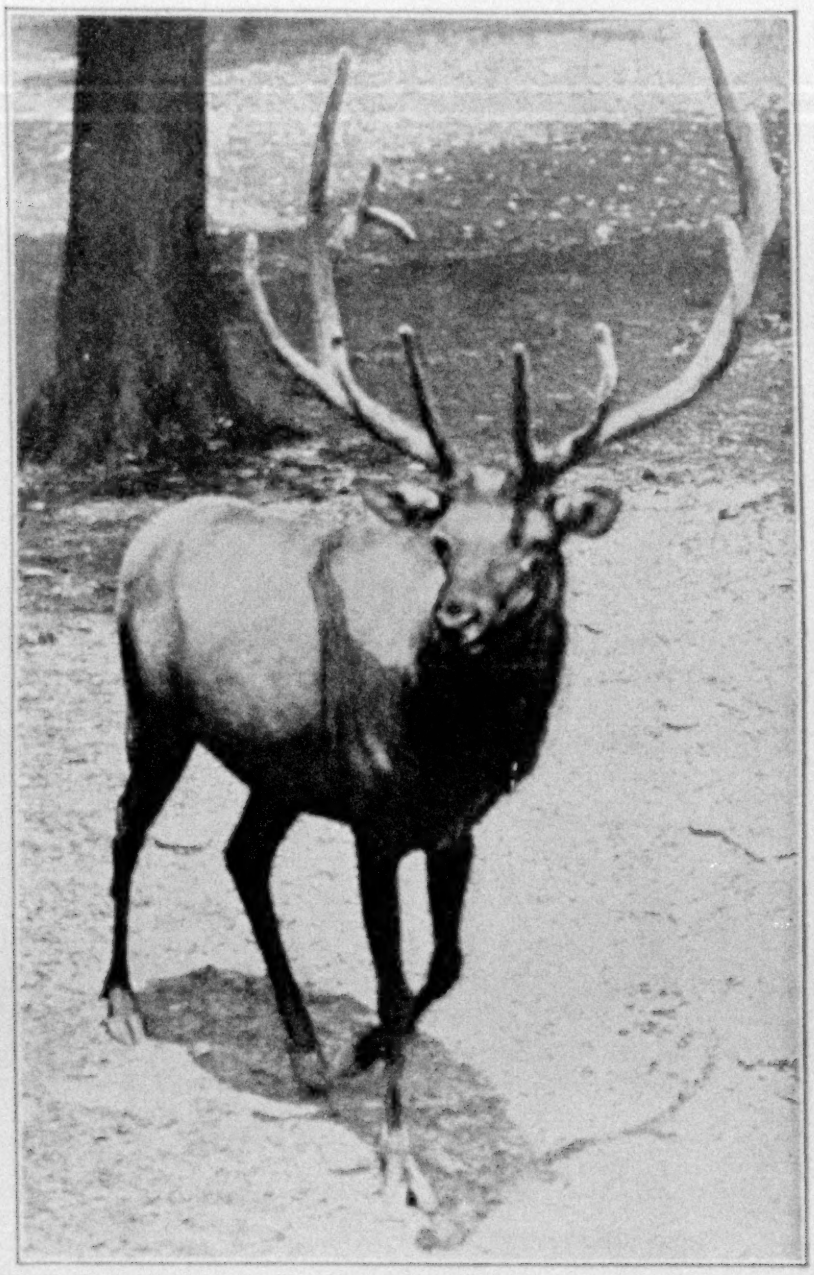
The fullest reports that have been received by the Department of Agriculture from breeders of elk are from George W. Russ, of Eureka Springs, Ark.

Mr Russ has a herd of 34 elk. They have ample range in the Ozarks on rough land covered with hardwood forest and abundant underbrush. The animals improve the forest by clearing out part of the thicket. They feed on buds and leaves to a height of 8 feet, and any growth under this is liable to be eliminated if the range is restricted. If not closely confined, elk do not eat the bark from trees, nor do they eat evergreens. In clearing out underbrush from thickets they are more useful than goats, since they browse higher. Goats, however, eat closer to the ground; and as the two animals get along well together, Mr Russ recommends the use of both for clearing up brushy land and fitting it for tame grasses.

The increase of elk under domestication is equal to that of cattle. Fully 90 per cent of the females produce healthy young. An adult male elk weighs from 700 to 1,000 pounds; a female, from 600 to 800 pounds. The percentage of dressed meat is greater than with cattle, but, owing to hostile game laws, experience in marketing it is very limited. An offer of 40 cents a pound for dressed meat was received from Saint Louis, but the law would not permit its export. Mr Russ says:

> From the fact that as high as $1.50 per pound has been paid for this meat in New York City and Canada, and that the best hotels and restaurants pronounce it the finest of all the meats of mammals, we are of the opinion that if laws were such that domesticated elk meat could be furnished it would be many years before the supply would make the price reasonable compared with other meats. Elk meat can be produced in many sections of this country at less cost per pound than beef, mutton, or pork.

Mr Russ thinks that large areas of rough lands in the United States not now utilized, especially in localities like the Ozarks and the Alleghenies, could be economically used to produce venison for sale, and he regards the elk as especially suited for this purpose.



ROCKY MOUNTAIN ELK: AN ANIMAL WHICH CAN BE PROFITABLY RAISED IN ALMOST ALL PARTS OF THE UNITED STATES

Another feature of Mr Russ's report is of more than passing interest. He says:

> We find from long experience that cattle, sheep, and goats can be grazed in the same lots with elk, providing, however, that the lots or inclosures are not small; the larger the area the better. We know of no more appropriate place to call attention to the great benefit of a few elk in the same pasture with sheep and goats. An elk is the natural enemy of dogs and wolves. We suffered great losses to our flocks until we

learned this fact; since then we have had no loss from that cause. A few elk in a thousand-acre pasture will absolutely protect the flocks therein. Our own dogs are so well aware of the danger in our elk park that they can not be induced to enter it.

Elk thrive best in preserves having a variety of food plants—grasses, bushes, and trees. Rough lands, well watered with clear streams and having some forested area, are well adapted to their needs. About as many elk can be kept on such a range as cattle on an equal area of fair pasture. There should be thickets enough to furnish winter browse, but this should be supplemented by a supply of winter forage.

Except when deep snows cover the ground, elk will keep in good condition on ordinary pasture and browse; but a system of management that provides other food regularly will be found more satisfactory. Hay and corn fodder are excellent winter forage; but alfalfa hay has proved to be the best dry food for both elk and deer. A little oats or corn—whole or chopped—may be fed each day. Elk are fond of corn, and feeding it affords excellent opportunities for winning their confidence and taming them. The same may be said of salt, which should be furnished liberally to all deer kept in inclosures. Running water, although not essential, is of great importance in maintaining elk in good condition.

Elk are much less nervous than ordinary deer, and less disposed to jump fences. When they escape from an inclosure they usually return of their own accord. If tame, they may be driven like cattle. Ordinarily, a 5-foot fence of any kind will confine elk. Henry Binning, of Cora, Wyo., writes us that a 4-foot woven-wire fence is ample for these animals. A small inclosure in which a vicious bull elk is to be kept should be higher and of stronger material.

The cost of stocking an elk preserve is not great. Usually surplus stock from zoological parks or small private preserves may be obtained at low cost, varying with the immediate demand for the animals. At times they have sold for less than $20 a head, and, with the present restrictions on sale, low prices are likely to continue. A few years ago T. J. Wilson, of Lewisburg, Ohio, paid $165 for three animals. A Michigan breeder recently offered to deliver a dozen head, sex and age not given, all fine specimens, for $500. This is, of course, a low price, not more than cattle would bring and less than the venison would be worth if it could be sold. If restrictions on the sale and shipment of venison from private preserves were removed, prices of the stock would, of course, soon advance, and necessitate a greater outlay in starting the business.

BREEDING THE VIRGINIA DEER

The Virginia, or whitetail, deer is the common deer of the United States. Including the half dozen geographic races that occur within our borders, it is distributed over most of the country, except Nevada and the major portions of Utah, Arizona, Washington, Oregon, and California. It is extinct in Delaware and practically so in a number of States in the Middle West. South of our borders a number of closely related species occur.

In view of the wide natural range of the Virginia deer, its adaptability to nearly all sections of the United States can not be doubted. Testimony as to its hardiness in parks and preserves is not so unanimous as that concerning the elk; but the general experience of breeders is that with suitable range, plenty of good water, and reasonable care in winter, raising this deer for stocking preserves or for venison may be made as profitable as any other live-stock industry. Not only do deer thrive on land unsuited for cattle or horses, but, like elk, they may be raised to great advantage in brushy or timbered pastures fully stocked with cattle or horses, as the food of deer rarely includes grass.

Advocates of the Angora goat industry state that within the United States there are 250,000,000 acres of land not suited to tillage or to the pasture of horses, cattle, or sheep, which are well

adapted to goats. Much of this land is suited also to deer and elk, and can be utilized for these animals with less injury to the forest cover than would result from its browsing by goats.

Virginia deer have often been bred in parks for pleasure or in large preserves for sport, but the economic possibilities in raising them have received little attention. Recently breeders have recognized the fact that they are profitable under proper management and would be much more so were conditions for marketing live animals and venison more favorable.

The Biological Survey has reports of successful experience in raising Virginia deer from more than a dozen persons, located in different parts of the country, who are now engaged in the business. The management of the herds varies slightly with the surroundings and the object for which they are kept.

Thomas Blagden, of Washington, D. C., began raising deer in 1874. After an experience of over a third of a century he is confident that the business can be made profitable. In his own herds he has carefully avoided in-breeding by securing new bucks from time to time. His stock is vigorous and of the large size characteristic of the Adirondack and other northern deer. Consequently the animals are in demand for breeding purposes, the bucks bringing $50 each and the does $75. He feeds grain, using corn and a mixture of bran and meal, and during the summer cuts as much wild forage as possible. He finds that the animals prefer the rankest weeds to the choicest grass. Of the various kinds of hay, they prefer alfalfa. He provides abundant water at all times.

John W. Griggs, of Goodell, Iowa, writes that he has been engaged in raising deer for about fourteen years. Until two years ago he sold all his surplus stock for parks, but since then has disposed of about half of it for venison. For park purposes he gets $20 to $30 a head, but they bring fully as much or more when fattened for venison. As to management of deer, Mr Griggs writes:

> In raising a large herd the park should be divided into two or three lots, and one plowed each year and sown to red clover, mustard, rape, and seeds of different kinds of weeds. Bluegrass and timothy are useless. Corn is the principal grain I feed. I feed it winter and summer. In winter I feed also clover hay, oat straw, and weedy wild hay. Deer when rightly handled are very prolific, and from 50 does one can count on 75 fawns. They can be raised profitably for venison—very profitably until overdone; but I would not advise one to go into it on a large scale without previous experience with deer.

The report received from C. H. Roseberry, of Stella, Mo., although less enthusiastic than others, is quoted because his herd approaches more nearly a state of true domestication. Under the date of January 13, 1908, Mr Roseberry wrote as follows:

> My experience in breeding the common or Virginia deer covers a period of seventeen years, beginning in March, 1891, when, as a boy of 16, I built a small inclosure of 1½ acres to confine a single doe that was captured as a fawn in the neighboring forest.
>
> A buck and other does were secured from year to year, until in 1900, by purchase and natural increase, my herd numbered 25 head of all ages.
>
> From 1891 to 1901 I lost every year from disease an average of 20 per cent. The climax came in the drought year of 1901, when my loss was 50 per cent from the disease known as "black tongue."
>
> I am convinced that, like cholera in swine, individuals recovering from this disease are immune from further attack. Apparently all of my herd were afflicted. The survivors and their progeny constitute my present breeding stock. I have made no purchases since 1901, nor have I suffered any loss from disease.
>
> For the last seven years my herd has averaged 70 per cent increase, all of which I have sold at satisfactory prices. I began selling at $20 per pair of fawns at 4 months of age, and $30 per pair of adults. I now get $40 and $60, respectively. I sell almost exclusively for pets and for propagating purposes, although a few surplus bucks have been sold for venison, averaging me 15 cents per pound gross weight.
>
> If we except the goat, I know of no domestic animal common to the farm that requires so little feed and attention as the deer. My herd has a range of only 15 acres, two-thirds of which are set to white clover, bluegrass, and orchard grass. I provide also a small plat of wheat or rye for winter pasture. With the above provision, in this latitude, no feed is required between April 15 and November 15. During the rest of the year a ration of corn, bran, or other mill feed somewhat smaller than that required for sheep, in connection with a stack of clover or pea hay to which they have

HERD OF DOMESTICATED VIRGINIA DEER BELONGING TO R. H. HARRIS, CLARKESVILLE, TEXAS

free access, is sufficient to keep them in good condition. Deer eat with relish nearly all of the common coarse weeds, and for clearing land of brush they are, I think, second only to the common goat.

Probably the greatest expense connected with the business of raising deer is the fencing. Another item of trouble and expense, when the animals are raised for pets, requiring that they be handled and shipped alive, is the fact that the fawns must be taken from the does when 10 days old and raised by hand on cow's milk. They are quite easily raised in this way, with but slight percentage of loss, but require frequent and careful attention for the first month. When they are allowed to run with the does their natural wildness cannot be overcome, no matter how gentle the does may be.

I have found the business profitable on the lines indicated. I believe they could be profitably bred for venison alone—certainly with less trouble and expense, since the fawns would be reared by the does and the trouble and expense of raising by hand would be eliminated.

My experience does not coincide with that of some other breeders in respect to the weakening of reproductive powers of deer by the confinement in parks. I have no barren does. Usually they produce a single fawn at two years of age; afterwards twins, and in rare cases triplets.

While deer are chiefly browsing animals, in captivity they eat nearly every kind of vegetation, including most kinds of garden stuff. They are fond of acorns, beechnuts, chestnuts, and other mast. Lily pads, leaves, lichens, and mosses are freely eaten. With plenty of range and an abundant variety of plants there need be, therefore, no apprehension concerning the deer's food. A good supply of running water must be provided, and the animals should have access to rock salt. If the browse and pasturage are scant, a small ration of grain should be fed. Of the grains, corn is generally recommended as a food; there is no waste, as the deer pick up every grain. Coarse hay full of weeds is preferable to timothy or other tame hays, except alfalfa. Of clover hay, deer usually eat the blossom heads

greedily, but waste the other parts. In winter feeding is necessary everywhere, and in the northern half of the United States shelter of some kind should be provided.

WILD DEER IN PRIVATE GAME PRESERVES

Individual owners, as well as associations, have established large private preserves in many parts of the country and stocked them with deer and other big game. The objects have been to preserve the animals and to provide sport for the owners. In the free life under the protected conditions generally provided, deer do remarkably well, the increase being even more rapid than in small parks.

Deer in Buckwood Park, a New Jersey preserve of 4,000 acres, belonging to Charles S. Worthington, increased in the ten years between 1892 and 1903 from 19 to about 400 head, and the number was then lessened because it was thought too large for the permanent sustaining capacity of the park. The St. Louis Park and Agricultural Company have about 1,000 deer and 400 elk in their 5,000-acre preserve in Taney County, Mo. The Otzinachson Rod and Gun Club six years ago placed about 90 deer, mostly does, in their 4,000-acre park in Clinton County, Pa. These have multiplied to nearly 3,000 head.

The good effect of such preserves on the supply of game in the State should not be overlooked. While they may temporarily restrict the hunting privileges of a few citizens, they ultimately become a source of game supply secondary in importance only to State preserves or game refuges. Already a number of private reserves have become overstocked, and game has escaped or been turned over to the State to become the property of the people. The success of private enterprise in propagating large game in inclosures has thus become an object lesson for State game commissioners and others, and suggests the feasibility of the State's undertaking a similar work for the people.

GAME LAWS RESTRICT DEER FARMING

The chief obstacle to profitable propagation of deer in the United States is the restrictive character of State laws governing the killing, sale, and transportation of game. Many of the States, following precedent, lay down the broad rule that all the game animals in the State, whether resident or migratory, are the property of the State. A few States except game animals that are "under private ownership legally acquired." A few others encourage private ownership by providing a way in which wild animals—deer and the like—may be captured for domestication. Generally, when private ownership of game is recognized by law, the right to kill such game is granted, but the owner is hampered by the same regulations as to season, sale, and shipment that apply to wild game. One by one, however, State legislatures are coming to recognize the interests of game propagators, and game laws are gradually being modified in accordance with the change of view.

The chief source from which deer and elk may be obtained for stocking preserves is from animals already in captivity. These must be transported from place to place or there can be no commerce in them, yet the laws of many States absolutely forbid their shipment. The laws as to possession and transportation of deer carcasses make the shipping of venison also illegal. General export of venison is legal from only six of the States, and three of these have no wild deer left to protect.

The laws concerning the season for killing and the sale of deer are often equally embarrassing to those who would produce venison for profit. The owner of domesticated deer cannot legally kill his animals except in open season. Owners of private preserves are similarly restricted and are limited to the killing of one or two animals in a season. More than half the States and Territories absolutely forbid the sale of venison. A few forbid the sale of venison produced within the State, but permit the sale of

XUM

that imported from other States—a most unjust discrimination against home industry.

Instead of hampering breeders by restrictions, as at present, State laws should be so modified as to encourage the raising of deer, elk, and other animals as a source of profit to the individual and to the State.

Safeguards against the destruction and sale of wild deer in place of domesticated deer are not difficult to enforce. For this purpose a system of licensing private parks, and of tagging deer or carcasses sold or shipped, so that they may be easily identified, is recommended.

It is believed that with favorable legislation much otherwise waste land in the United States may be utilized for the production of venison so as to yield profitable returns, and also that this excellent and nutritious meat, instead of being denied to 99 per cent of the population of the country, may become as common and as cheap in our markets as mutton.

NATIONAL GEOGRAPHIC SOCIETY

HON. J. HAMPTON MOORE, Member of Congress from Philadelphia, and for some years a life member of the National Geographic Society, is sending to each member of the Society a copy of his speech, "Peary's Discovery of the North Pole," presented to Congress March 22, 1910. The address, which makes a pamphlet of 36 pages, and is an historical summary of the organization and achievements of the last Peary Expedition, contains much valuable information not previously published.

Particularly interesting is the first publication of the original order of President Roosevelt, in July, 1908, directing that Robert E. Peary be detailed to the U. S. Coast and Geodetic Survey, to make tidal observations along the shore of the polar sea.

Twenty-one large volumes of tidal records were obtained by Commander Peary, November, 1908, to June, 1909, and were delivered to the Government in October, 1909. The experts of the Survey who are reducing and discussing the records report that the tides along the northern coast of Grantland and Greenland are quite different from what had been heretofore supposed, and they expect to obtain important new knowledge after these records have been thoroughly examined.

The Hydrographic Office of the Navy Department has already prepared a chart showing the line of soundings made by Peary. The last sounding was made five miles from the pole. The methods and apparatus used for making the soundings are fully described.

Mr Moore's speech was to advocate the passage of a special resolution which he had recently introduced, and which is also published in the pamphlet as an appendix, that the Congress should accept the verdict of the National Geographic Society commission which examined Peary's records and found that he had reached the North Pole.

The decision of the National Geographic Society has been accepted without question by the Royal Geographical Society of London, and the geographical societies of Berlin, Paris, Geneva, Rome, Brussels, Antwerp, Vienna, Dresden, Madrid, Edinburgh, Saint Petersburg, Tokyo, Mexico, Lima (Peru), the geographical societies of Chicago, New York, and Philadelphia, and practically every geographical society in the world.

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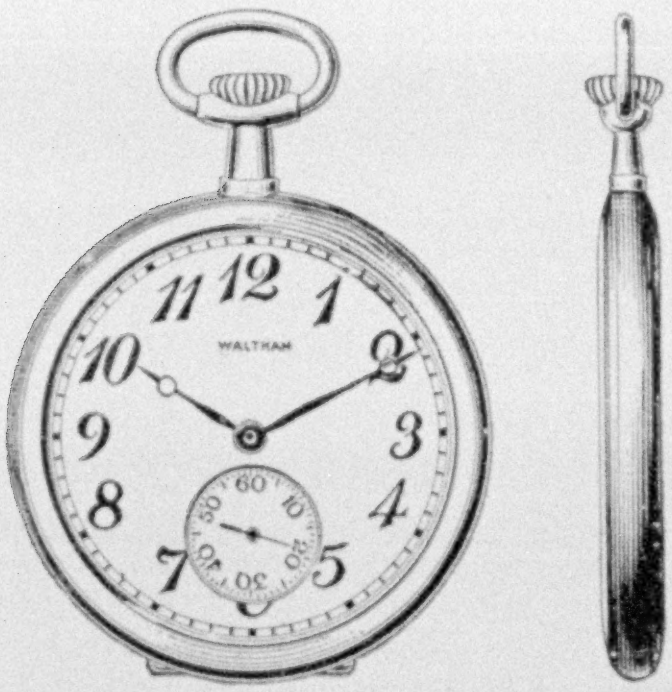

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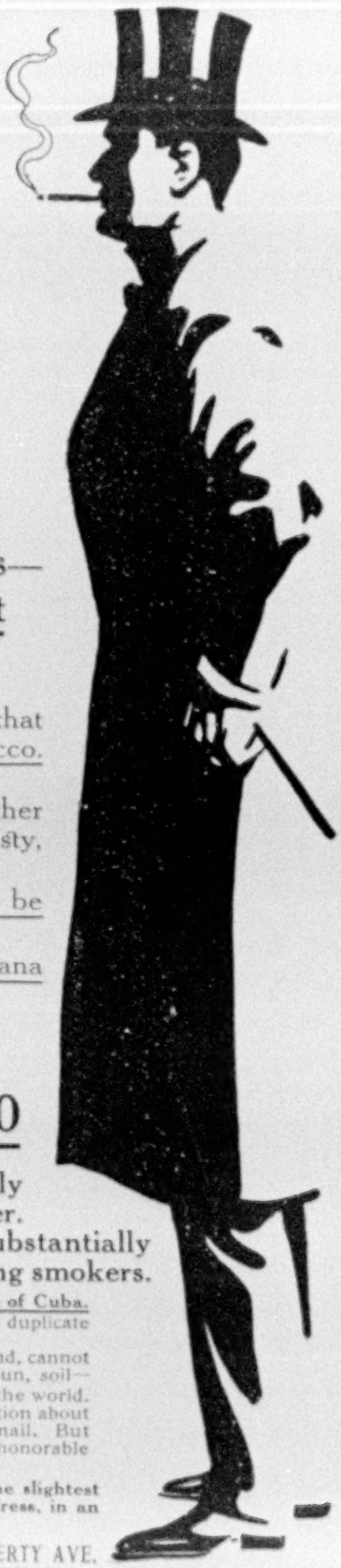

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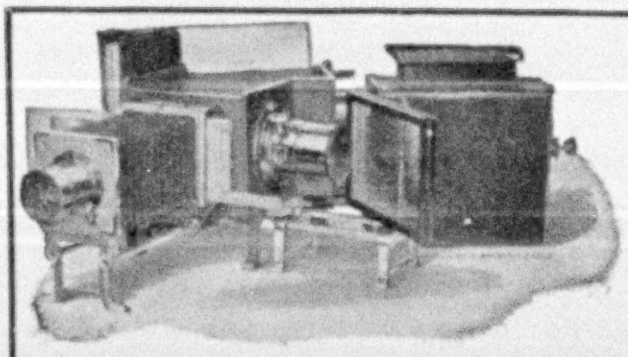

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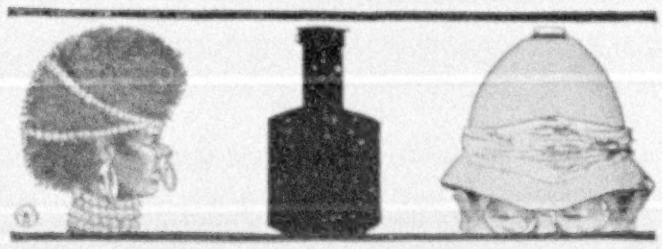

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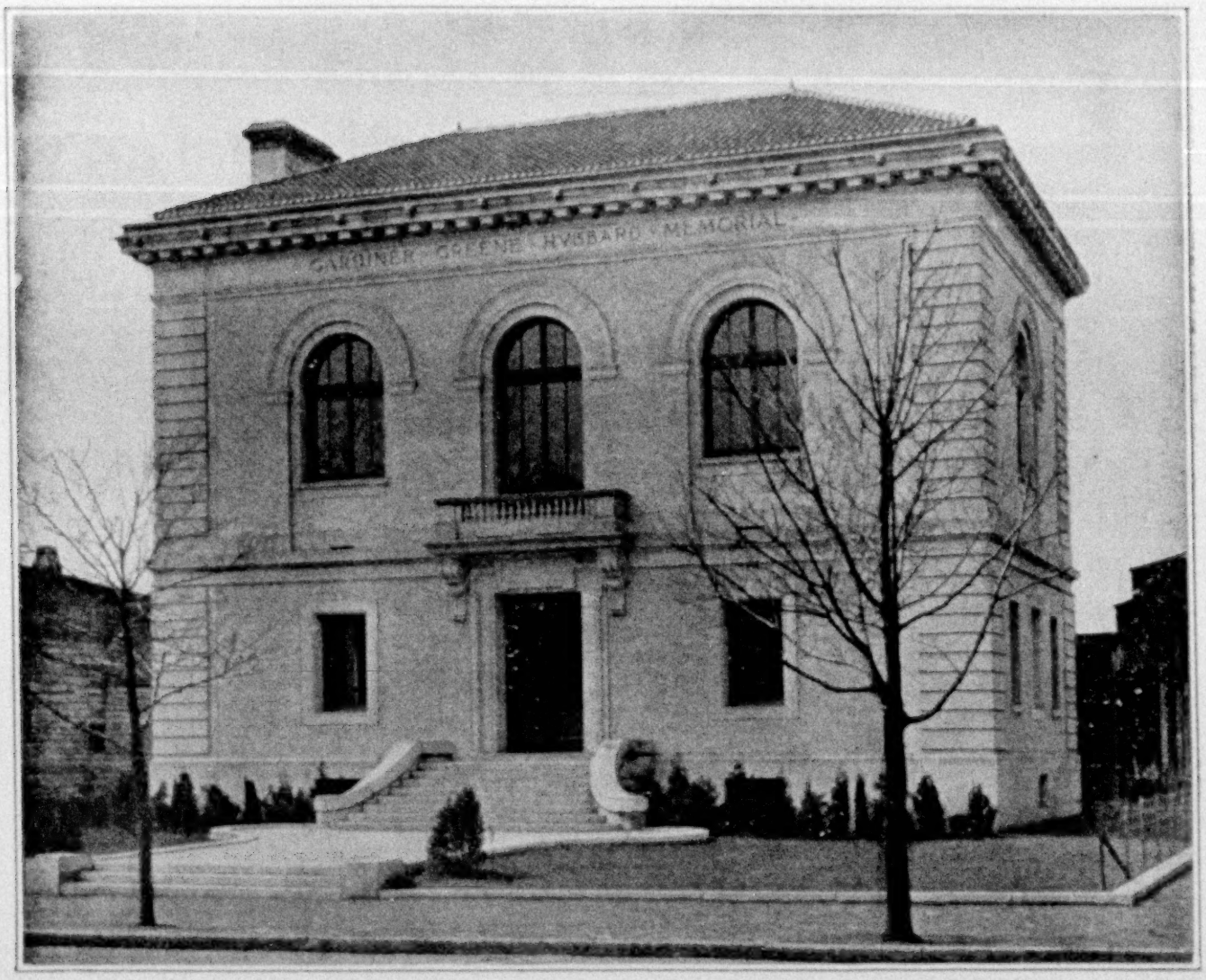

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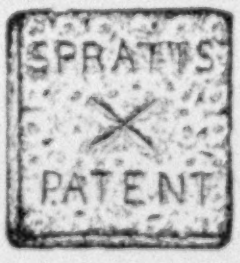

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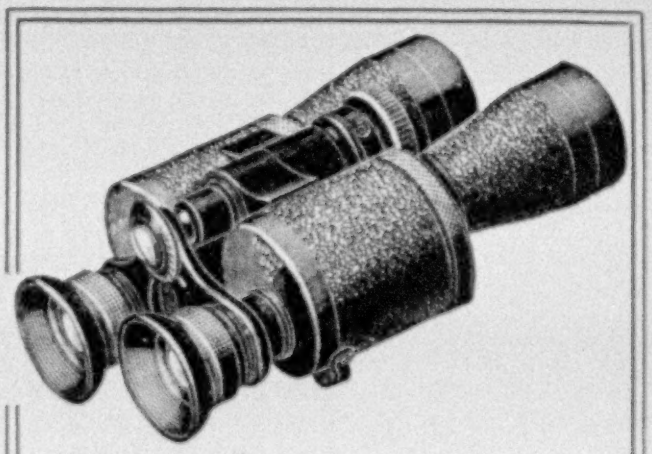

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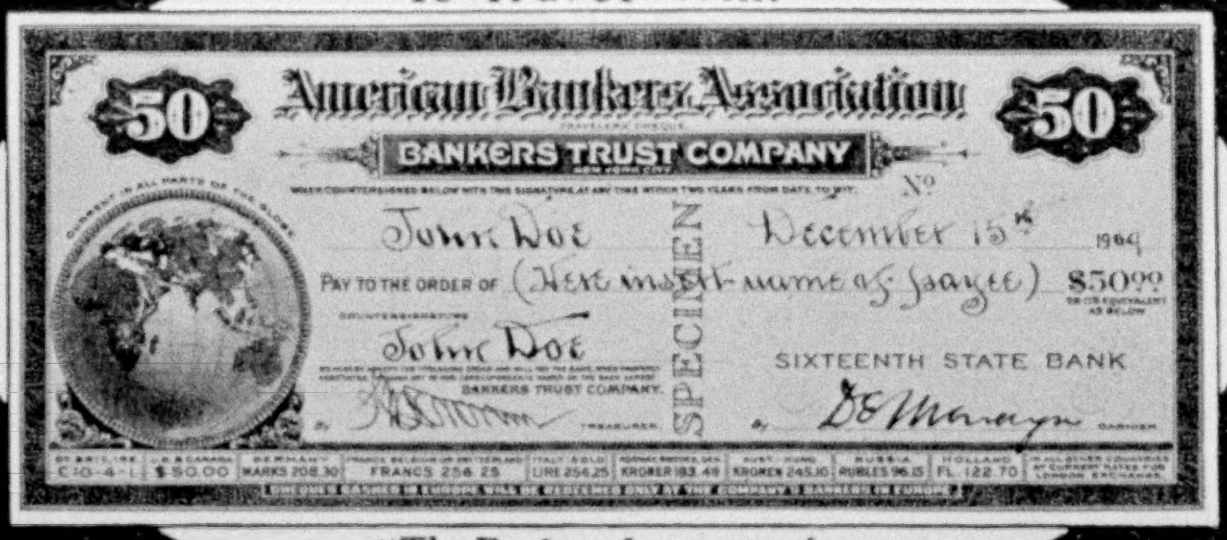

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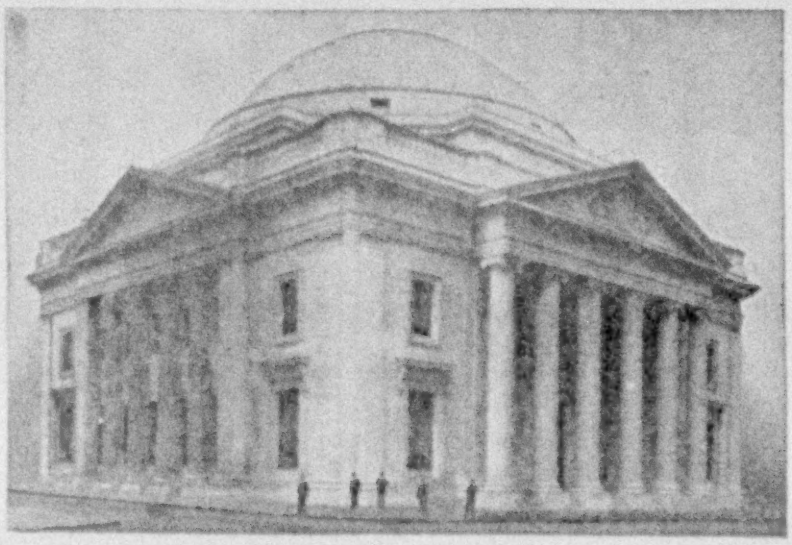

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